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LEEDS BECKETT UNIVERSITY AND RUSHMORE BUSINESS SCHOOL

LME DISSERTATION

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LEEDS BECKETT UNIVERSITY AND RUSHMORE BUSINESS SCHOOL

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LIST OF ABBREVIATIONS

AARC – American Association for Respiratory Care

CCU – Critical Care Unit

CTSS – Close Tracheal Suction System

ETT – Endotracheal Tube

HAI – Hospital Acquired Infection

ICU – Intensive Care Unit

IHI – Institute for Healthcare Improvement

ITU – Intensive Therapy Unit

MV – Mechanical Ventilation

OTSS – Open Tracheal Suction System

PEEP – Positive End Expiratory Pressure

VAP – Ventilator Associated Pneumonia

CARE OF PATIENTS ON MECHANICAL VENTILATION IN DECREASING THE INCIDENCE OF VENTILATOR ASSOCIATED PNEUMONIA IN THE INTENSIVE CARE UNIT

1.0 INTRODUCTION

Also called as Critical Care Unit (CCU) or the Intensive Therapy Unit (ITU), the Intensive Care Unit (ICU), is a highly specialized unit where highly sophisticated equipment for patient monitoring are found. Staffs working there are trained to look after patients who are seriously ill and in need of close monitoring and intensive therapy (Nhs.uk, 2016). Patients admitted in the ICU usually require invasive procedures for diagnostic or therapeutic purposes. It includes procedures such as central venous catheterisation, chest tube insertion, urinary tract catherisation or mechanical ventilation (MV). ICU is also associated with higher risks of infection. Patients in ICU have 5-10 times more risk of infection than patients in wards (Wagh and Acharya, 2009).

MV is also an invasive procedure common in ICU. In a retrospective cohort study done for year 2005, of 6 469 674 patients hospitalised in the United States 180,326 (2.8%) were on MV (Wunsch et al., 2010). Another study done for the period of 1 January to 31 December of 2012 in England showed that of 156,474 of patients admitted in ICU, 69,606 (44%) received MV (Harrison, 2014). The incidence of patients receiving MV in the author's area of practice according to the ICU register there, amounts to 12 cases for the period of August 2016 to August 2017. This represent around 1 case of MV per month This figure was much less 5 years ago where the total number of patients on MV were around 5 for a whole year showing an increase in cases attending the ICU for MV each year.

Infection is one of the complication faced by patients on MV. The term nosocomial or hospital acquired infection (HAI) is defined by the WHO as any infection acquired in any healthcare setting which was not present or incubating at the time the patient got admitted (WHO, 2002). The commonest infection associated with MV is pneumonia, hence the term Ventilator Associated Pneumonia (VAP). VAP can be defined as the occurrence of pneumonia, which was not present before and occurring within 48 hours or more, in patients intubated by an endotracheal or tracheostomy tube (Wagh and Acharya, 2009). It is diagnosed by the isolation of the causative pathogen, characteristic change in sputum, fever, leukopenia or leukocytosis and progressive pulmonary infiltrate (Kalanuria et al., 2014). In the US, VAP is ranked second among the HAI, and the most common in intubated and ventilated patients ranging from 1.2 to 8.5 per 1,000 ventilator days in ICUs (9-27 % of all patients on mechanical ventilation) (Kalanuria et al., 2014). The British Journal of Medical Practitioners described VAP as being the deadliest infection in ICUs, occurring in approximately 10-28% of patients in critical care (Wagh and Acharya, 2009). In the author's area of practice, from the 12 patients on mechanical ventilation for the period of August 2016 to August 2017, only 2 patients did not end up with pneumonia. This can be explained by the fact that these patients remained on MV for only 24 hours.

VAP is associated with increased ventilator days, hospital stay, increased mortality and morbidity and increased healthcare cost [(Hadda et al., 2014); (Gadani et al., 2010)]. Despite the outcomes of patients with VAP is serious, its incidence can be reduced using preventive strategies (Gadani et al., 2010). In the author's area of practice there is no established guidelines or protocols for the care of patients on ventilator in preventing VAP. This can account for the high incidence of VAP noted. Therefore, this essay will focus on the best available evidence-based strategy through a systematic literature search and its possible implementation in the author's area of practice in view of decreasing the incidence of VAP.

2.0 SEARCH STRATEGY

The essay title, "care of patients on mechanical ventilation in decreasing the incidence of ventilator associated pneumonia in the intensive care unit" was entered as basic search on the Leedsbeckett online library "Discover." This database was chosen for the high quality of its academic published articles and also because of the availability of recently published articles. 4375 articles were obtained. The first 20 articles were scanned by title only. No relevant articles were found. A systematic search in the advance search option was then carried out entering only key words. PICO approach was used to choose the key words. This is a method of formulating questions to help make the search (Guides.lib.purdue.edu, 2017). Different words of the same meaning like " intensive care unit," "critical care unit," or "intensive therapy unit" as well as their abbreviations (ICU, CCU, ITU) were also entered and sometimes combined using Boolean logic "AND," " OR," "NOT" to expand or narrow the search and to make sure not to miss any relevant articles. The same procedure was done for the other keywords used and the results scanned by title. After trying the different combinations, 1000 articles resulted.

Then the inclusion and exclusion criteria were used to further refine the search. Limiters such as "full text," "scholarly peered reviewed journals," and English language were chosen which limited the search to 517 articles. Again the first 20 articles were scanned by title. 3 relevant articles were identified and save for later reference. The remaining articles were further refined by narrowing the publication year from 2012 to 2017, following which 307 articles remained of which 2 were saved for further reading.

To target more specific and relevant articles, the key words “intensive care patients,” “VAP bundle,” and “decreased incidence of VAP” were entered in the search engine in the advance option following the PICO method. Only 37 articles were left. Then a thorough scanning of the article’s abstract were done and 10 articles were chosen. See appendix 2 for more detailed description of the search strategy used.

3.0 LITERATURE REVIEW

3.1 CAUSES OF VAP

28% of patients on MV, ends up with VAP as a complication (Amanullah and Mosenifar, 2015). Patients on MV, are intubated and sedated. There is depression of their cough reflexes which have a direct effect on the clearance of secretions by the microvilli lining the lower respiratory tract. As a result, harmful microorganisms enter the lungs by micro aspiration causing pneumonia (O'Keefe-McCarthy et al., 2008). Evidence have shown that the incidence of VAP is related with the number of days the patients are maintained on MV. It is estimated that for the first 5 days, the incidence is 3 % per day, for day 6-10, incidence is 2% per day and beyond day 10, the incidence is 1% per day (Amanullah and Mosenifar, 2015). This is also supported by Kalanuria et al. (2014), who highlighted the highest risk of VAP during early hospitalization, occurring in 9-27% of patients on MV. However, most study would estimate the incidence of VAP to be in a range of 10-40% (Weinstein et al., 2004). The disparities in the incidence rate made by different studies may be explained by variables such as the number of days the patients have been on MV, moreover, the incidence will not be the same for patients in a surgical or a medical

ICU (Weinstein et al., 2004). The diagnostic criteria for the diagnosis of VAP may also be different in different area of study. This is also corroborated by the fact that there is no universally accepted gold standard criteria for proper diagnosis of VAP (Kalanuria et al., 2014).

Over time, several strategies have been designed to care for patients on MV, to help decrease the rate of VAP. There has been the creation of the VAP or the ventilator bundle. The VAP bundle can be defined as a group of evidence-based safety precautions to be observed by the health personnel in caring for patient on MV (The Free Dictionary.com, 2009). Studies have shown the importance of using a VAP bundle as an effective tool to prevent VAP. A retrospective study was made by the National Taiwan University from January 2006 to March 2013, to assess the effectiveness of the VAP care bundle. 6 items of care were studied in 5 surgical ICUs. 27,125 candidates were assessed during the study and the result shows that compliance with the care bundle eventually lead to a fall in the incidence of VAP (Lim et al., 2015). Another study made in China done by the meta-analysis of 195 studies between 2010-2015 shows that despite a decrease in 2006, the incidence remained relatively high (Ding et al., 2017). However, in another study made in the Suburban Community using a medical record database for the collection of information from January 2003 to December 2009 showed no improvement in the incidence of patients with VAP (Ding et al., 2013). This difference in trend may be due to geographical locations of the different studies, the diagnostic tool used and the criteria of selection of the candidates.

A study made by Speck et al. (2016) identified as much as 65 different bundle approach and the care in each specific bundle varies. In the same study, bundle approach which were more important and easy to implement were identified and put together to make [4]a new VAP prevention bundle. The following key measures were considered as important:

1. [4]Head of bed elevation
2. Daily assessment of patients on MV on the readiness to wean.
3. Oral hygiene 6 times per day minimum.
4. Chlorhexidine oral toilet twice daily
5. Subglottic suctioning for those patients on MV for more than 72h.

Other structural measures identified as important were:

1. Using close endotracheal suctioning system (CTSS).
2. Changing closed suctioning catheter only when needed.
3. Replace ventilator circuit only when soiled or damaged.
4. Moisture and heat exchanger to be changed [28]every 5-7 days and when indicated.
5. Promote the use of non-invasive facilities.
6. Remove condensate from circuits keeping the circuit closed.
7. Promote early mobility.
8. Hand washing.
9. Limit supine position.
10. Standard precaution when suctioning.
11. Favoring orotracheal intubation than nasotracheal.
12. Prophylactic systemic antimicrobial therapy to be avoided.
13. Tracheal suctioning only when necessary.
14. To avoid gastric distention.

In the author's area of practice, not all of these measures are observed since no existing protocol exist. In many of the studies made such as the one carried out by the National Taiwan University (Lim et al., 2015), the success of the approach used was evident because they modified an already existing bundle and adapted it in their working context. The key measures to be implemented, should be "SMART." SMART is a current mnemonic used in nursing in setting goal when a nursing care plan is made (Healthpei.ca, 2012). This mean that the measures to be implemented should be "specific," "measurable," "achievable," "realistic," and "time bound."

4 "SMART" areas were identified by the author as not being well performed in his area of practice. A systematic literature search will be done to collect evidence-based information before their implementation. The measures chosen by the author for implementation are:

1. Head of bed elevation.
2. Oral hygiene.
3. Endotracheal suctioning.
4. Care of ventilator equipment.
    4.1 Change of ventilator circuits and filters.
    4.2 Humidifiers and removal of condensate.
    4.3 Nebulizer.

3.2 HEAD OF BED ELEVATION (HOB)

HOB elevation is particularly important in patients receiving enteral feeding because it minimize aspiration (Harbrecht, 2012). Because there were no evidence based recommendation, a study was made by Niël-Weise et al., (2011), in finding recommendations on head of bed elevation in MV patients. A systematic review was undertaken to find the advantages and the problems associated with semi-sitting position in MV patients. Then the review collected were examined by a board of European experts so that recommendations be given. A population of 337 patients was considered in the review. It was found that although the review was not able to prove the clinical benefits, the experts however recommend the head of bed elevation 20-45 degree. In the same study it is mentioned that head of bed elevation do possess some disadvantages. Namely, stasis of blood in the lower limbs, haemodynamic variation or instability, bed sores and difficulty for nurses to care for the patient during certain procedures. Another more recent study carried out in 2015, with a greater population of 878 candidate in 10 studies was done to investigate HOB elevation versus flat bed in preventing VAP. Again they found that a sitting positon of >30 degree may reduce VAP compared to a 0-10 degree elevation. However, the authors recognised the high risk of bias and limited amount of evidence (Wang et al., 2016).

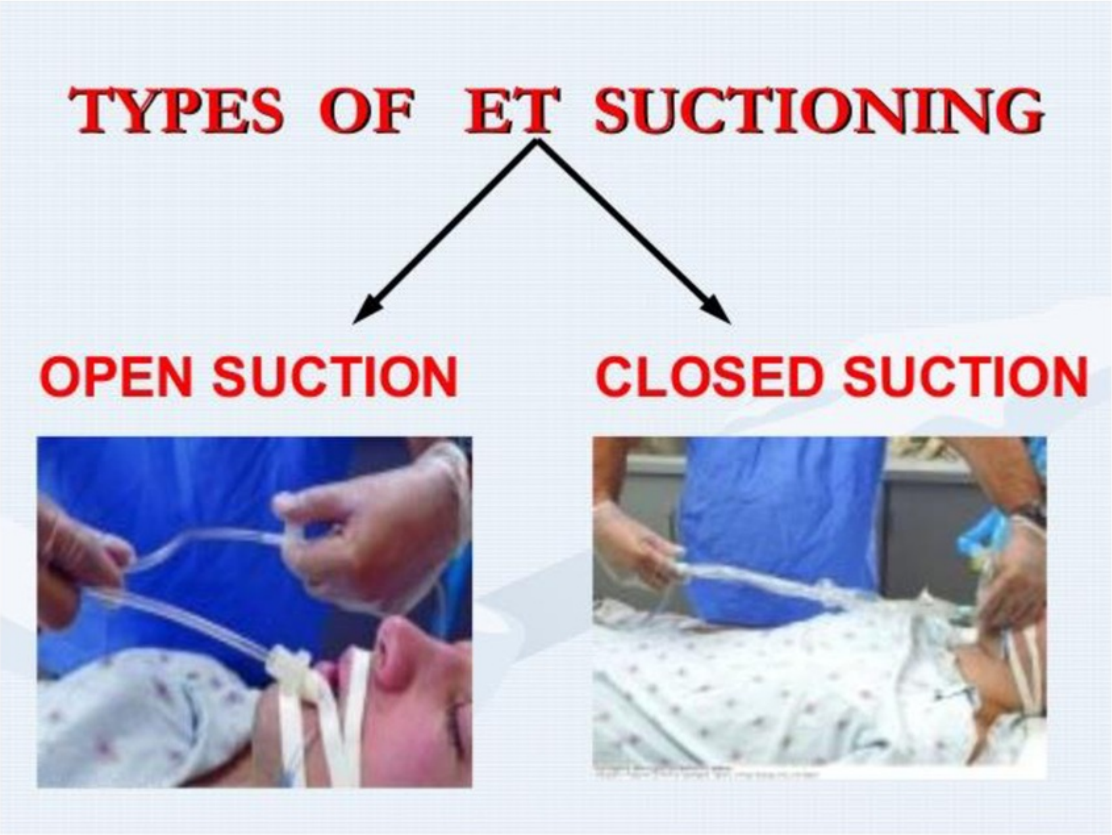
3.3 ORAL HYGIENE

The Institute for Healthcare Improvement (IHI) designed a bundle of care for patients on MV to reduce VAP incidence. This bundle of care comprises of 4 key points (HOB elevation, sedation vacation, peptic ulcer and deep venous thrombosis prophylaxis). Oral hygiene was not mentioned. A study was made by Fields, (2008) aiming to support the idea that oral hygiene together with the IHI bundle can help further decrease the incidence of VAP. 27 candidates selected were on MV, and were divided into a control group which received usual oral care and the intervention group which were given oral care 8 hourly. The results were immediate with a fall to zero in patients with VAP within a week and this was maintained throughout the study. Another more recent study published in 2014 but with a larger population group of 90 patients on MV was made. The aim was to see the effect of a particular oral hygiene regimen which includes tooth brushing, suctioning, the use of sodium bicarbonate and rinsing with 1.5% hydrogen peroxide as antiseptic, on the occurrence of VAP in an ICU. The control group receives a more conventional oral hygiene regimen in which oral care was done using a non-traumatic clamp and sponge and rinsing with chlorhexidine (CHX) gluconate 0.2% as antiseptic. From the 90 participants, 8.9% developed VAP in the study group and 33.3% in the control group (Lev et al, 2015). Supported by many other evidence based studies, the IHI bundle in 2010 incorporated oral hygiene with chlorhexidine as the 5th element of the bundle highlighting its importance (Institute for Healthcare Improvement, 2012). Then the author wanted to know how effective and in what concentration was chlorhexidine important to reduce VAP.

This was the aim of a study made in 2013, to study the effectiveness of chlorhexidine in preventing VAP. A literature search was made on former clinical investigations, which compared the effectiveness of chlorhexidine with other conventional oral care in decreasing the incidence of VAP. The intervention group of 1623 participants received mouth care with chlorhexidine and the control group of 1662 participants received a placebo. They found chlorhexidine to significantly decrease the incidence of VAP in patients on MV. Moreover they found that a concentration of chlorhexidine of 0.12-0.2% was enough to protect patients from VAP and that higher concentration did not seem to give more protection (Hoshijima et al., 2013). The effectiveness of chlorhexidine mouthwash or gel have also been demonstrated by a Hua et al. (2016) in a more recent study.

3.4 ENDOTRACHEAL SUCTIONING

Tracheobronchial secretions are present in all patients on MV because their cough reflex is impaired, they have excessive mucous secretions and inability to clear the mucous by themselves. Therefore, endotracheal suctioning is important in removing these retained secretions. Endotracheal suctioning is not without risks, and these includes: dysrhythmias, hypoxaemia or damage of tracheal mucosa (Sole et al., 2015). For this reason, the [27] American Association of Respiratory care in 2010 recommended that tracheal suctioning be made only when indicated clinically (Ncbi.nlm.nih.gov, 2010). Suctioning can be done using 2 broad techniques, the [8] open tracheal suction system (OTSS) and closed suction tracheal system (CTSS) (see figure 1). The open technique involve disconnecting the [8] ventilator and introducing a single use catheter in the endotracheal tube (ETT). The CTSS came later by the year 1980 with the advantage of not having to disconnect the patient from the ventilator therefore promoting safe suctioning of the patient. In this system, a multiuse catheter with a one way valve is introduced in the airway through the ETT for suctioning (Elmansoury and Said, 2017). Many studies have been made to study what method is best. The CTSS have the advantage of decreasing respiratory pollution because there is no need to disconnect the ventilator and as a result, there will be decrease pulmonary infection. It also improves oxygenation and thus decrease risks of hypoxaemia, the positive end expiratory pressure (PEEP) is maintained, it limit environmental contamination with endotracheal secretions and decreased lung volume loss. CTSS has also the functional advantage of using only one suction catheter and the procedure operated by only one nurse (Elmansoury and Said, 2017). A study aiming to investigate the use of OTSS compared with CTSS in mechanically ventilated patients with regards to VAP incidence was carried out in 2012 in medical and surgical ICUs. 141 participants were selected and divided into 2 groups. One received OTSS and the other CTSS. [5] They found no difference in the incidence of VAP between these 2 groups (Elmansoury and Said, 2017). In the author's area of practice, no provision for the CTSS do exist. Endotracheal suctioning have always been done using the OTSS. According to the research already done, although VAP incidence will not be affected by whatever system chosen, the CTSS do have some advantages over the OTSS as already mentioned. Therefore, the possibility of introducing this system should be considered.



Source: https://www.slideshare.net/jasleenbrar03/endo-tracheal-suctioning

Figure 1- OTSS and CTSS

3.5 CARE OF VENTILATOR EQUIPMENTS

It is important to care for the different components that makes the ventilator because the devices used, act on the mucous membrane of the respiratory tract and is related to development of VAP in those patients on MV. The reusable components of the ventilator should therefore be clean and disinfected for 30 minutes at a temperature of 75 degree Celsius. There is no important risk factor related to the internal components that makes up the ventilator (Alp and Voss, 2006).

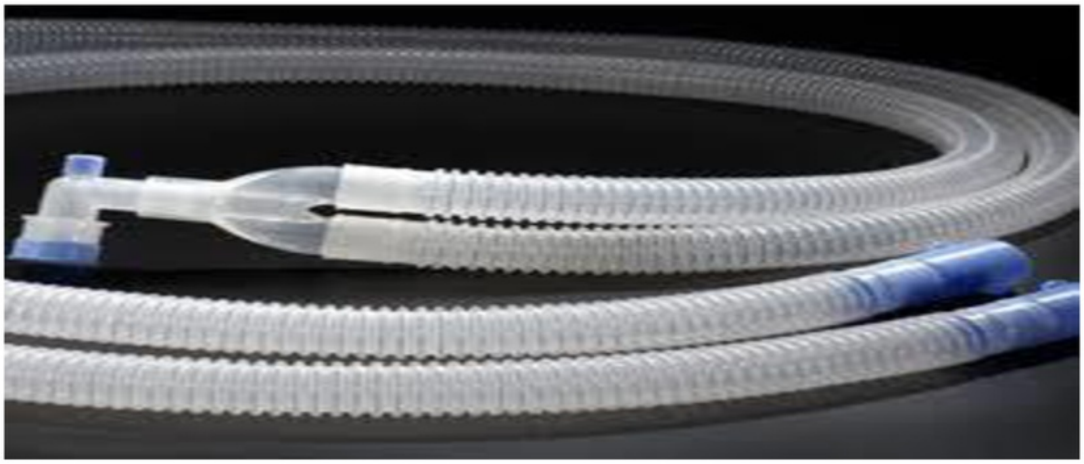
3.6 CHANGE OF VENTILATOR CIRCUIT AND FILTERS

Ventilator circuits, refer to all the tubing used to connect the patient to the ventilator (Figure 2). In the year 1960, the existing literatures were such that ventilator circuit were changed in some hospitals every 8 hours or daily (RcJournal.com, 2003). However more recent studies recommend that ventilator circuits are not to be changed routinely. Han and Lin published their study on the effect of ventilator circuit changes and VAP in 2010. Literature search was made using online databases where comparison was made concerning circuit change every 2 days, every 7 days, at regular intervals and no routine circuit change in relation to the incidence of VAP. A population of 19169 candidates were included in the study. They found a decrease in the incidence of VAP as the circuit change interval was prolonged (Han and Lin, 2010). This is also highlighted in the American Association for Respiratory Care (AARC) clinical practice guideline advancing that the time frame the circuit can be safely used is not known (Cited in Rcjournal.com, 2003). However, the AARC in a publication in 2007, recommended that the ventilator circuit should not be changed more than once weekly (AARC, 2007). According to Alp and Voss (2006) the changing of the ventilator circuit should be done each time the circuit is soiled or in the presence of mechanical malfunction.

Filters plays a major role in the protection and safety of patients on MV (Figure 3). Filters used on ventilator plays an important role in providing protection against moisture droplets, viruses and bacteria. It also helps protecting the ventilator and the contamination of the breathing circuit (Medtronic.com, 2017). Filters exist in two types, namely, the mechanical and the electrostatic one being the most commonly used in the breathing circuit. The microbial penetration value of filters expressed as the filtration performance with a confidence limit of 95% should also be considered while choosing for an effective filter (Wilkes et al., 2000). Furthermore, for the optimal use of filters, factors like humidity, airflow rate, filter drying and obstruction should be considered (Hylton, 2011).

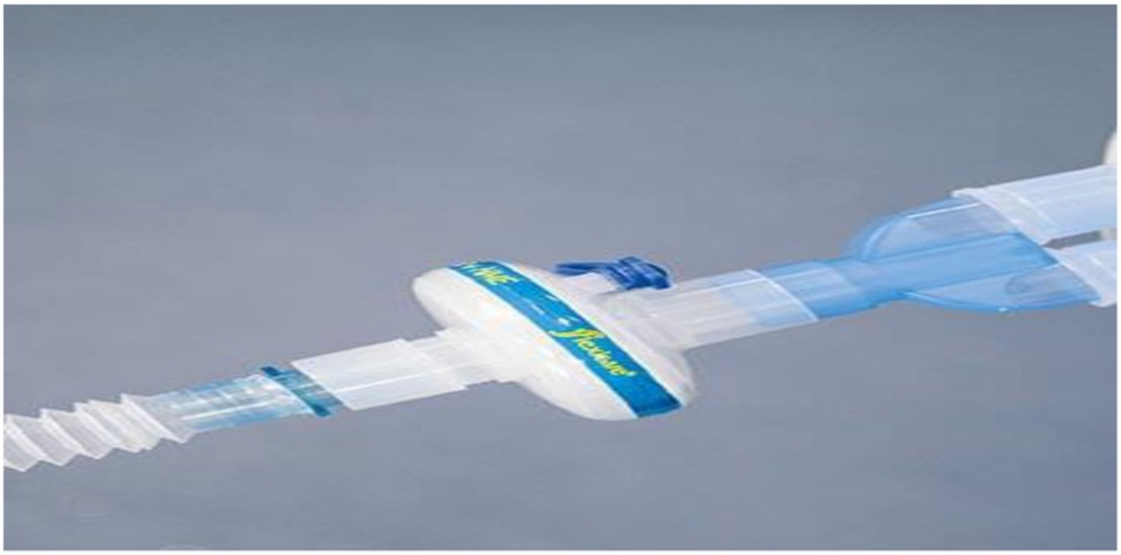
Many research have been made to investigate the effectiveness of filters in mechanical ventilation in decreasing VAP such as the one done by Kirton et al., (1997) who found a decrease in late onset of VAP, stay in ICU and cost of equipment.

Furthermore, Alp and Voss, (2006) found the use of filters on the inspiratory phase circuit as not necessary as its use on the expiratory part of the circuit even though further studies is necessary. Hylton et al., (2011) claim the importance of using filters on both the inspiratory and the clinical benefits associated with filtering the expiratory gases while Lorente et al., (2003) in a study made found that filters in the ventilator circuit did not reduced that much the incidence of VAP and found its use as not necessary.



Source: https://dir.indiamart.com/impcat/ventilator-circuits.html

Figure 2 – Ventilator circuit



Source: http://www.flexicare.com/education/breathing-filters/breathing-filters-introduction

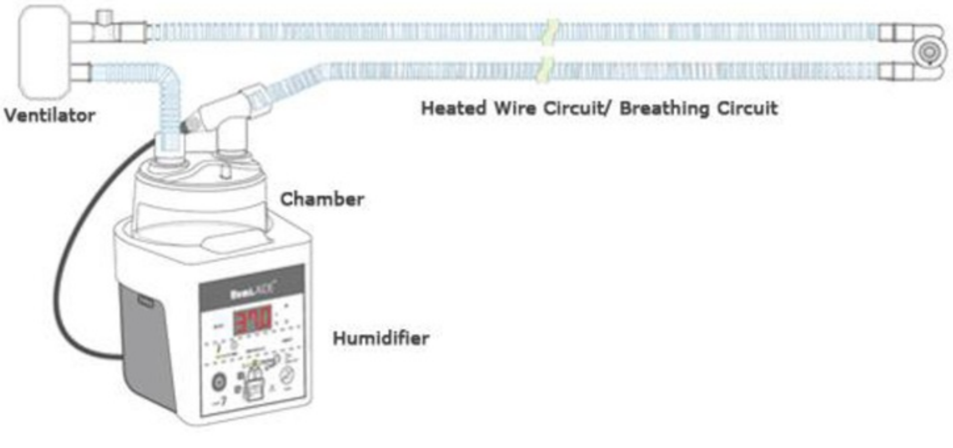
Figure 3 – Bacterial filter

3.7 HUMIDIFIERS AND REMOVAL OF CONDENSATE

Humidity is defined as the amount of water in the gas state present in the atmosphere or in a gas (Oxford Dictionaries, 2017). The highly vascularized and connective tissue of the respiratory lining of the upper airway, makes it ideal for moistening and heating the passage of gases in the respiratory system (Al Ashry and Modrykamien, 2014). During endotracheal intubation the upper airway is bypassed. The process of moistening and heating the circulating air is altered. The passage of dry gases is then associated with airway damage affecting specially the epithelial cells lining the respiratory tract. It is characterized by increased work of breathing, thick secretion, cough and atelectasis. Therefore, the function of the external humidifier is to replace the absence of the natural mechanism of humidifying and heating air passage in the upper airway. It works by adding water molecule to the circulating gas and is of 2 types, active and passive humidifiers (Al Ashry and Modrykamien 2014).

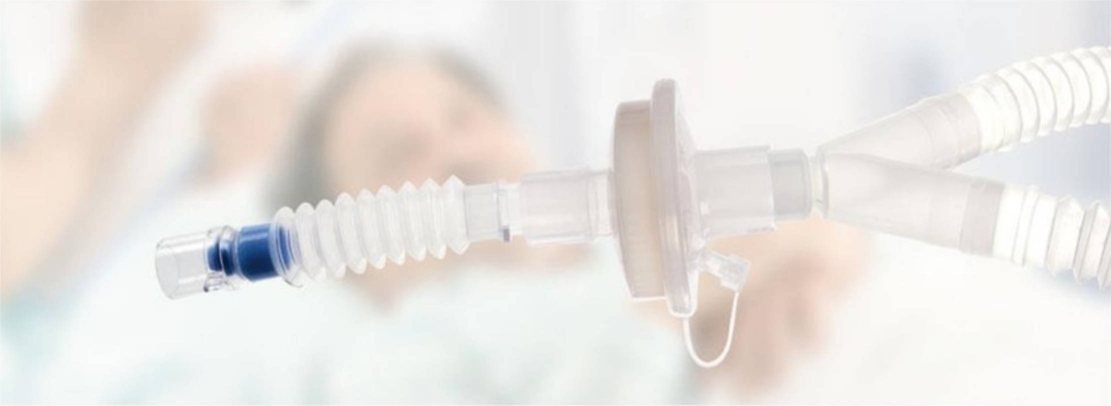
In the active humidifier (Figure 4), the moistening, heat and flow comes from an external source, while in the passive one (Figure 5), temperature and hydration comes from the exhaled patient's gas (Cerpa et al., 2015). Many research have been made as to which humidification system works best in decreasing VAP incidence. Kranabetter et al., (2004) conducted a research to investigate the incidence of VAP associated with the active and passive humidification system. 3585 patients were chosen and divided in 2 batches. One receiving active humidification and the other passive humidification. [5] 99 cases of VAP were reported. The incidence for active method was 13.5 per 1000 ventilator days compared to 9.6 for the passive method thus highlighting the benefit of changing strategy from active to passive method of humidification. The use of passive humidifiers is also recommended [36] by the American Association of Respiratory Care (AARC) guideline (2003) for the low incidence associated with VAP, and also its benefits concerning issues like resistance, airway occlusion and dead space volume. Moreover, there are precautions to be taken with the use of passive humidifiers as it may be a source of contamination and colonization. The AARC recommend not to change the humidifier daily and that it can be safely used for at least 48 hours. It is also mentioned that some devices may be used for up to 1 weeks (Rcjournal.com, 2003). This is supported by Alp and Voss, (2006) associating the use of passive humidifier with the formation of less condensate hence less bacterial colonization as well as possessing bacterial filtration characteristic.

Humidification is also associated with the formation of condensate in the ventilator tubing. This forms an excellent medium for the colonization and contamination of the ventilator circuit by harmful micro-organisms, which can have a direct effect on VAP incidence (Alp and Voss, 2006). The contamination of the circuit by the condensate may happen by the direct manipulation of the airway or by secretion coming from the patient. This contaminated condensate may in turn enter the lungs by manipulation of the circuit during endotracheal aspiration, moving the ventilator or during patient's bath (Lorente et al., 2007). Therefore, it is important that this condensate be removed regularly. Alp and Voss (2006) also stressed on precautions to be taken concerning the risk of the condensate accidentally entering the patient's airway during its removal, as well as the risk of contamination for the health personnel during circuit disconnection and the disposal of the condensate. To avoid all complications related to the drainage of condensate, Al Ashry and Modrykamien, (2014) suggests the use of water traps (Figure 6) which is an easier way of draining the condensate without having to disconnect the circuit.



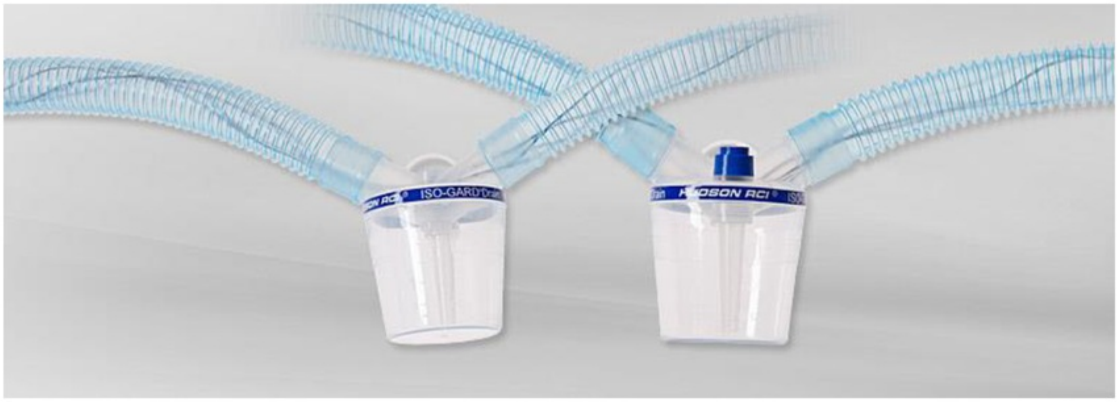
Source: http://www.humiaide.com/active_humidification.html

Figure 4 – Active Humidification System



Source: http://www.humiaide.com/passive_humidification.html

Figure 5 – Passive Humidification System



Source: http://www.teleflex.com/en/usa/images/neptune-2014/img-banner-preventing-VAP.jpg

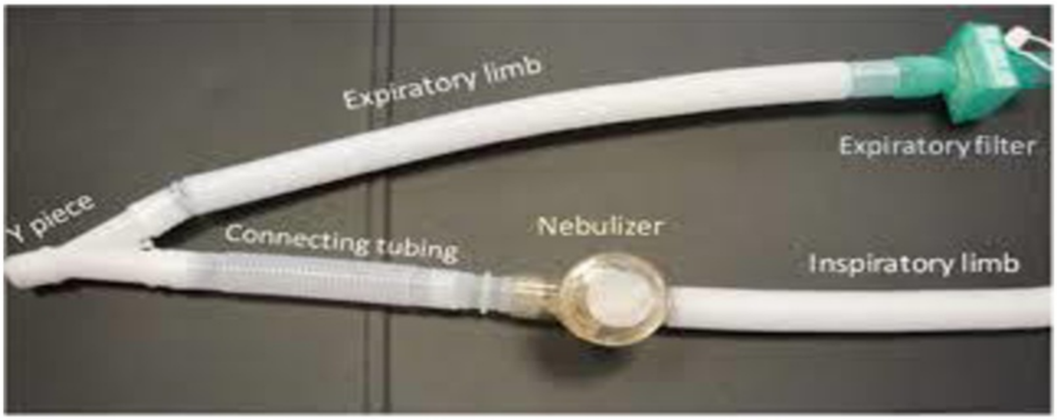
Figure 6 – Water trap

3.8 NEBULIZER

Nebulizer are small devices that split liquid into fine droplets delivering its drug effect into the patient's airway (TheFreeDictionary.com, 2012). Used also for the humidification of air, it is connected to the inspiratory phase of the ventilator circuit during mechanical ventilation (Alp and Voss, 2006). The use of contaminated solutions and contamination of the droplets by condensate in the ventilator circuit are the different ways infection can pass directly into the lungs. Thus recommendations have been made for infection control when using nebulizer:

1. Fill the nebulizer immediately before use.
2. Drugs and water use should be sterile.
3. Drugs should not be added to the already filled chamber of the nebulizer.
4. Daily cleaning and disinfection of the receptacle.
5. Sterile water should be used to rinse and allow to dry.
6. Use of correct connecting piece.

(Alp and Voss, 2006)



Source: http://anesthesiology.pubs.asahq.org/data/Journals/JASA/931045/34FF5.jpeg

Figure 7 – Nebulizer

3.9 EDUCATION AND TRAINING

Training and education is another important aspect to consider in the quest to decrease VAP rate in MV patients. This is proven by a quasiexperimental study made by Okgün Alcan et al., (2016) to investigate the implementation of a care bundle in an ICU. In the initial phase, they observed the adherence of nurses with regards to the VAP care bundle. In the second phase, education and training were given to the nurses. In the final phase, they observed adherence to the VAP bundle by nurses, after education was given. They found that adherence to the VAP care bundle significantly improved from 10.8% to 89.8% and the VAP rate also decreased from 15.91 per 1000 ventilator days to 8.50 per 1000 ventilator days. This is also supported by Parisi et al., (2016) who highlighted the importance of implementing a VAP bundle together with the proper staff training in decreasing VAP rate as well as the length of stay of patients in ICU.

3.10 CONCLUSION

Many bundle of care exist to care for patients on MV. These bundles are made up of many key areas and each key area is proved to be effective in decreasing the incidence of VAP. Why certain institution choose a particular VAP bundle is closely related to their area of practice and the context in which they are performing. The author picked 4 key areas thought as being a weakness in his area of practice for their implementation as an initial phase and the possibility of using an already in use and documented VAP bundle and its implementation in a 2nd phase.

4.0 PROBLEM STATEMENT

VAP is a complication affecting patients on MV. VAP fortunately is an avoidable complication if evidence-based practice is observed through adherence to a VAP care bundle by all healthcare givers. Reducing VAP rate have a direct impact on patient's outcome and prognosis, reduction in intensive hospitalised cost, ventilator days and quality of life of the patient. In the author's area of practice, almost all patients on MV ends up with VAP, thus seriously affecting patient outcome. This can be explained by the fact that no VAP care bundle exists. The nurse staff are practicing by learning from their seniors who never questioned their own practice. The lack of evidence-based practice is also explained by the fact that there is no specialized training for nurses working in ICU. If no evidence-based bundle of care is implemented the incidence of VAP will keep on rising affecting patient's prognosis. However, with the implementation of a VAP care bundle, appropriate training and education, can help to significantly decrease the incidence of VAP in the author's area of practice.

5.0 CHANGE PROPOSAL

5.1 SITUATION

The occurrence of VAP in patients on MV is approximately 9-27%. It is ranked 2nd most common hospital acquired infection in ICU, and the first among patients on MV ranging from 1.2-8.5 per 1000 ventilator days (Kalanuria et al., 2014). The situation in the author area of practice is quite alarming. Of 12 patients who were on MV for the period of August 2016 to August 2017, only 2 patients did not end up with VAP. These 2 exceptions can be explained as they received MV for no more than 24 hours. The situation is alarming because till now there is no established bundle of care for the prevention of VAP. Furthermore, healthcare team involved in the care of patients on MV have not been trained properly and fail to observe evidence-based practice skills needed while caring for this group of patients.

5.2 PROPOSED SOLUTION

The author is proposing to implement the 4 aspect of care (section 3.1) as a first implementation phase, comprising of:

1. Head of bed elevation.
2. Oral hygiene.
3. Endotracheal suctioning.
4. Care of ventilator equipment.

These 4 key areas are included in almost all VAP care bundle and the author have identified them as not being performed according to evidence-based literature, in his area of practice. For their implementation, education and training will be given for all the ICU staffs. Upon the successful implementation of these 4 aspects of care, then the author plans to implement an already used VAP care bundle called FAST HUG as a second implementation phase (Ferreira et al., 2016). FAST HUG is a mnemonic for **F**eeding, **A**nalgesia, **S**edation, **T**hromboembolic prophylaxis, **H**ead of bed elevation, stress **U**lcer prophylaxis and **G**lycaemic control. These are also evidence based factors closely linked with occurrence of VAP. Oral hygiene, cuff pressure monitoring of endotracheal tubes and regular subglottic suction are also 3 factors that will be considered and are observed when implementing the FAST HUG bundle of care (Ferreira et al., 2016). Again prior to the implantation of the second phase, education and training will be given so that the team is accustomed with the newly introduced measures.

5.3 BENEFITS

Upon the successful implementation of the 1st and the 2nd phase, the benefits expected and supported by a study made by Ferreira et al., (2016) are:

1. Significant reduction in VAP incidence.
2. Decreased ICU hospitalised cost.
3. Reduction in the number of days of antibiotic use.
4. Reduction in mortality rate.
5. Patients cared with FAST HUG lived longer.
6. Its implementation is easy.
7. The acronym FAST HUG is easy to memorise and hence its application by healthcare team easy.
8. Improved quality of care.
9. The bundle can be used for any ICU patients. It is not restricted only for patients on MV.
10. Will not overload or put more pressure on healthcare givers.
11. Will not increase hospital budget.

(Ferreira et al., 2016)

6.0 SWOT ANALYSIS

[19] SWOT stands for **S**trength, **W**eakness, **O**pportunity and **T**reats. It is a tool used to identify the strength and weakness of an organization, as well as discovering the opportunities present and the threat that may be encountered upon the implementation of a project (Mindtools.com, 2017). It will help building a broader awareness of an event and will result in a better [31] strategic planning and better decision making (Ctb.ku.edu. 2017). A SWOT analysis will be made to have a global interpretation of the problems that may be encountered during the implementation of the care bundle, as well as to identify the already existing facilities that exist.

6.1 STRENGTH

1. Adequate human resource for the implementation of the care bundle.
2. The ICU is a new built one with modern infrastructural facilities.
3. The equipment used for MV are moderns one with facilities like: water traps, bacterial filters, and humidifiers according to the norms recommended by the different literature reviews already explored.
4. There is availability of chlorhexidine 2% for oral toileting as recommended by the different literatures.
5. Education and training will be free with infrastructural facilities for the training.
6. Demonstration will be made in the ICU itself and will be free of charge.
7. There is already a continuous nurse education program in the ICU.
8. The implementation of the FAST HUG bundle and its success has already been documented and it is associated with no additional cost for its implementation.
9. All the changed proposed are evidence-based.

6.2 WEAKNESS

1. Lack of evidence-based practice from nursing staffs caring for patients on MV.
2. Lack of motivation.
3. No bundle of care have ever been implemented before, for any condition.
4. Staffs don't have a clear picture what is expected from them during patient's care on MV.
5. Most staffs are not aware of the impact of VAP on patient's outcomes.

6.3 OPPORTUNITIES

1. Successful implementation of the care bundle can help the development of other care bundles for any other conditions, specific for the author's area of practice.
2. This may encourage other staffs to come up with other care bundles or protocol.
3. Acquisition of more modern medical equipment that are recommended by supported literatures that will benefit patients such as the CTSS (see section 3.4 on endotracheal suctioning).
4. Successful implementation of the care bundle may be reproduced in other department such as the general wards or any other units.

6.4 THREATS

1. Acquisition of new technologies in the future for better patient care may need training from more trained professional as well as being expensive. This may be rejected by the upper management.
2. Staffs resistance to change.
3. Time management.
4. To ensure nurses adherence to the care bundle.

7.0 ACTION PLAN

The estimated time for the implementation of the 1st phase is estimated to be more than a year (see appendix 1 for a detailed action plan). In the initial phase several goals will have to be met and it includes the following steps:

1. Gathering evidence-based literatures.
2. Making a survey of the available facilities as well as the missing ones.
3. Sharing of the change proposal with the nurse in charge and a report of the survey made in step 2.
4. Formation of a project team comprising of those staffs motivated and in favor of the change.
5. Having individual brainstorming session with the different nurse staffs, identifying any resistance and taking notes of any critiques or different points of views.
6. Overcoming any resistance.
7. Training of staffs.
8. Doing a pilot test.

9. Finding ways to assess any progress in terms of VAP incidence.
10. Identifying any shortcomings and overcoming them.
11. Implementation on the project.
12. Stabilization of the project.

After stabilization of the 1st implementation phase, the second phase which includes the implementation of the FAST HUG care bundle, using the same steps as above will be introduced.

8.0 CHANGE MODEL

In the quest of delivering high quality care in the health system, making a change is one of the key aspect that needs to be considered. It is important to find ways of redesigning how care should be delivered to achieve an optimal patient benefit and satisfaction (Transforming Health, 2014). A change management model is important as it helps to describe, simplify and understand the principle of applying a change in any institution. The Lewin's model of change is one popular and easy framework used to identify forces and factors influencing a change (Strategies for managing change.com, 2017). This model has inspired many other models with a 3-step model change. The Lewin's force field analysis consist of 3 stages of change theory (Connelly, 2017). In an attempt for the successful implementation of the care bundle the Lewin's model of change will be used. The 3 phases which make up the model namely; unfreeze, moving and refreezing will be applied for the implementation of the VAP care bundle.

8.1 UNFREEZE

Is the first stage of the Lewin's model of change, considered as the most difficult and stressful one, as it involve preparing the institution for the change (Mind Tools, 2013). Sometimes work is being done routinely over time. These tasks performed by habit sometimes tend to be irrelevant in the current level of practice, and no one will try to question the way thing are being done and the possibility of doing things differently. This is also true in the author's area of practice where caring for patients on ventilator is being done without anybody asking question if the way care is being given is evidence-based. Gathering information and making literature search enabled the author to identify areas of mal practice. At this stage of the model, everybody must be made aware why a change is needed (Morrison, 2014). The unfreeze stage therefore is about making the ICU staffs aware of the way things are being done routinely, let them have a perspective of their bad habits and bringing the new possibilities of doing things before them. This will be done by exposing the incidence of VAP worldwide and the poor patient's outcome associated with it. Then the staffs will be made aware of the situation in the author's actual area of practice, making them realise of the need to change things. Documentation about VAP and its implication in terms of mortality and morbidity will also be exposed as well as the bad habits in caring for the ventilator equipment. When trying to bring about a change and correcting the way things are actually being done, this may bring about strong reactions and put the organization in a crisis situation (Mind Tools, 2013). This have for effect of building up motivation so that a state of equilibrium is again reached (Connelly, 2017). This is the goal expected in the unfreeze stage. To reach this new equilibrium, it is going to take time for the institution to adapt to the new direction set. Since in the author's area of practice, the staffs there have never been through such change, the author designed the implementation to take place using only 4 key measures instead of implementing one whole care bundle at one go. The 4 key measures considered as being “SMART” and realistic by the author, will be more easily accepted by the nurse staff and be implemented as a first implementation trial.

8.2 CHANGE

After having created a state of disequilibrium in the unfreeze stage, it is expected that staffs involved in the project implementation be ready to follow the new direction set with an open mindset. At this stage it is expected that all stakeholders are already aware of the change to be made and are involved in the formulation of a strategic plan to meet the goal expected (Antwi and Kale, 2014). To implement the change, education and training will be given to all staffs. While most reviews would stress the top management to deliver the training, the NHS Leadership Framework 2011(Cited in; Kerridge, 2012a) highlighted the importance for all staffs including nurses, to play an active role in service improvement without taking in consideration the role, function or discipline. As per the NHS Leadership Framework, the author took the responsibility to deliver the training. For the implementation phase a project team will be set up comprising of those staffs who are motivated in bringing about a change as well as the nurse in charge as his experience and influence would be beneficial for the team and the change process.

Time and communication is an important aspect to make the change (Heathfield, 2017). It is important to give the staffs sufficient amount of time to be accustom with the new direction set and to ensure this transition period, a good communication flow between the staffs and the institution will have to be present all the time.

Prior to the implementation of the care bundle, all areas of confusion as well as any resistance should be overcome before going for a pilot test (Kerridge, 2012b). It is an important step before the implementation of a new project and its main purpose is to see how feasible a project is (Leon, 2012). Undertaking a pilot study possess advantages such as saving time and money as well as improving the accuracy of the project to be implemented (PMI, 2014). It can also help identify areas of shortcomings that was not apparent before implementation phase (Kerridge, 2012b). Assessing the success of the change during the pilot test is also important. Each member of the project team will be responsible to monitor the staffs' adherence to the care bundle as well as collecting information on any shortcomings as well as assessing the patients for incidence of new cases of VAP. Getting the project team and the staffs, involved in the change process is also directing them to take ownership of the project and growing their interests in keeping things moving (Kerridge, 2012b). To ensure staff's adherence to the care bundle, a checklist will be prepared for all patients and be filled by staffs caring for them to make sure every element of the care bundle is respected.

An estimated period of one month will be allocated to run the pilot test.

8.3 REFREEZE

This stage is about how stability is reached upon the implementation of the change (Connelly, 2016). Action taken in this step is important so that the change is maintained over time, otherwise the staffs will revert back to their old equilibrium and habits (Kritsonis, 2005). Therefore this stage is about finding strategies to reinforce the change and to keep the change. One of the strategies that will be considered is to set up regular meeting with the project team and the staffs to ensure that the change implemented meets the original aim and things haven't gone back to previously practice method. Secondly, training and an ongoing education should continue to make part of the change process. This is because it is less probable that the staffs grasp everything taught since the beginning and remember everything all the time, unless refresher and an ongoing training is maintained at regular intervals (Change Management Consultant, 2015). This will help in keeping the staffs focus on the institution aim. Another important factor to consider in maintaining a change is the influence played by the senior management and leadership support (Maurer, 2010; cited in Kerridge, 2012b). All the staffs involved in the team should be aware that the change project is fully supported by the nurse in charge. Celebrating the change and sharing it with the other colleagues is also important (Kerridge, 2012b). This is the 3rd stage in change reinforcement describe by Creasey (2017). He highlighted that success be small as it is should be identify. The progress should be made public making sure all stakeholders as well as the supervisors are aware and give them the opportunities to praise the staffs involved in the change. Furthermore, celebrating success is a way to motivate those staffs that were a bit reluctant with the change and that needed to witness success to believe. Connelly (2017) argued that the refreezing stage should not be seen as a "rigid frozen block," but rather to see it as a more flexible stage where the next change brought forward would be much easier to be implemented. This is what the author is expected when implementing the FAST HUG bundle of care in the 2nd phase.

9.0 LEADERSHIP AND MANAGEMENT

Change is important as it helps deliver high quality care to patients (Transforming Health, 2014). However managing the change is a complex process and involve, evaluation, planning and the implementation of innovative projects that are benefic and evidence-based (Al-Abri, 2007). How a manager handle the various situations will depend a lot on the management style and leadership method used in a particular situation (Heartfield, 2017a). Kurt Lewin identified 3 broad categories of management style; laissez-faire, authoritarian and democratic (Cited in; City College, 2015). An effective manager should however possess a good leadership style as they are expected to be able to help their team identify the need to change, lead the change, transforming the institution and allowing reflection to take place for problem solving purposes (Pillai, 2011). Like there are different management style, there are different leadership style such as; situational, transformational, transactional, servant and cross cultural leadership (Pillai, 2011). Therefore a leader is one possessing the ability to influence and guide members of an institution (Rouse, 2014).

To bring about a change is a challenge as this include motivating people, formulating new strategies, applying business models and finding new ways to collaborate with the different stakeholders (Torben, 2015). But one of the most difficult problem when implementing a change is resistance, documented by Paul R. Lawrence since 1969 (Cited in Harvard Business Review, 2017) till now (Heathfield, 2017b). Resistance to change can be defined as all actions opposing new change that may alter the normal habits or status quo in an institution (Heathfield, 2017c). Resistance to change should however not be seen as a problem and should in fact be expected whenever there is a change (Conner, 2012).

For the change to occur, people go through a transition process which in certain cases may be traumatic (Mind Tools, 2017). The role of the manager is to lead this transition as smooth as possible so that the institution can benefit from the change more quickly. To help managers understand and forecast how people react during the transition period, the change curve model was created. It involves 4 stages:

1. Shock and denial.
2. Anger and fear.
3. Acceptance.
4. Commitment. (Mind Tools, 2017)

Therefore, for this transition period to be as smooth as possible, the management and leadership style used to lead this change is of utmost importance. Being aware of the different leadership styles that exist, the leadership success should however be situational to meet all the teams' requirement (Pillai, 2011; Benincasa, 2012; Cardinal, 2013). That is, a **pacesetting leader** when quick results is needed in an already skilled and motivated team. **Authoritative leader** when new vision is needed promptly. **Affiliative leader** creating emotional bonding and membership feelings. **Coaching**

leader helping people developing personal strength for the future. **Coercive leader** effective during crisis events, when urgent compliance is needed. Finally, a **democratic leader** promoting participation of the whole team towards a common agreement (Benincasa, 2012 and Cardinal, 2013).

10.0 REFLECTION

Reflection is about exploring an event and learning so as to gain experience from it and developing new approaches should the same event is met (Libguides.cdu.edu.au, 2017). To help us reflecting in a systematic way, many models of reflection exists, and the John's model of reflection will be use here.

Writing a dissertation is quite new for me and it was a whole new experience. Obviously, there were moments of doubt. The timeframe to settle the work, the time management needed for the work to be done, the word count, the academic requirements which include the systematic literature search, proper documentation of the search and presentation of the work, were among the factors that impressed me as well. It was a great challenge for me and felt stressed and motivated at the same time to explore this new experience.

I felt enthusiastic about the topic to be explored in the dissertation. After 5 years working in the ICU, there were so many questions I've asked my seniors that remained unanswered. For example, why some nurses when mounting the ventilator circuit put a bacterial filter on both the inspiration and expiration limb, while others were choosing either the inspiration or the expiration limb. The dissertation question was most welcome as it gave me the opportunity to solve many questions. I was even not aware of the devastating effect of VAP. It was only when I started my literature search that I understood how serious VAP had on MV patients and their overall outcomes. Therefore, this dissertation was a mean for me to explore more doubtful areas where I suspected things were not being done according to evidence-based practice.

Even though I've suspected some areas of uncertainties in the nurses practice, I've cared for the patients on MV just like my seniors did, without thinking about other alternatives. However, when I started my literature search, the alternatives were so much evident, and by the time I've finished my dissertation, so many ideas on how thing could be done differently became apparent. Furthermore, as a former student in the scientific field, I've never studied management and leadership. This was also quite new for me and took a lot of my time to grasp the course material. However, again it was amazing for me when I've explored the management and leadership skills and their invaluable importance while implementing a change.

Since reflective writing have to do with providing the individual with alternatives to address an event differently, this dissertation really gave me alternatives about possible approaches to consider when caring for patients on MV as well as ideas how to implement the change.

11.0 CONCLUSION

Associated with high mortality rate, high healthcare cost, increased hospitalised and ventilator days, VAP continue to be the number one infection in patients on MV. It is not an exception in the author’s area of practice. However, caring for patients on MV paying attention to evidence-based practice bundle of care can help reducing the incidence of VAP. Moreover, recognizing the importance of implementing new innovative changes in the healthcare setting, changing the status quo, as well as the management and leadership skills necessary to maintain the change is of utmost importance. VAP being a serious disease condition it can however be avoided if all this package of care is observed.

12.0 BIBLIOGRAPHY

1. AARC. (2007). *Long-Term Invasive Mechanical Ventilation in the Home* —2007 Revision & Update. [online] Available at: https://www.aarc.org/wp-content/uploads/2014/08/08.07.1056.pdf [Accessed 2 Sep. 2017].
2. Al Ashry, H. and Modrykamien, A. (2014). *Humidification during Mechanical Ventilation in the Adult Patient*. [online] Hadawi. Available at: https://www.hindawi.com/journals/bmri/2014/715434/ [Accessed 6 Sep. 2017].
3. Al-Abri, R. (2007). *Managing Change in Healthcare*. [online] Oman Medical Journal. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294155/ [Accessed 18 Sep. 2017].
4. Alp, E. and Voss, A. (2006). *Ventilator associated pneumonia and infection control*. [online] NCBI. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1540438/ [Accessed 2 Sep. 2017].Alpha Plus Centre. (2004). Tips for Conducting a Literature Search. [online] Available at: http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lecturenotes/literatur-search-tips-2004.pdf [Accessed 22 Sep. 2017].

5. Amanullah, S. and Mosenifar, Z. (2015). *Ventilator-Associated Pneumonia: Overview of Nosocomial Pneumonias, Epidemiology of VAP, Clinical Presentation of VAP*. [online] Emedicine.medscape.com. Available at: http://emedicine.medscape.com/article/304836-overview#a2 [Accessed 29 Aug. 2017].
6. Antwi, M. and Kale, M. (2014). *Change Management in Healthcare*. [online] Queen's School of Business. Available at: https://smith.queensu.ca/centres/monieson/knowledge_articles/files/Change%20Management%20in%20Healthcare%20-%20Lit%20Review%20-%20AP%20FINAL.pdf [Accessed 17 Sep. 2017].
7. Benincasa, R. (2012*). 6 Leadership Styles, And When You Should Use Them*. [online] Fast Company. Available at: https://www.fastcompany.com/1838481/6-leadership-styles-and-when-you-should-use-them [Accessed 19 Sep. 2017].
8. Cardinal, R. (2013). *6 management styles and when best to use them* - The Leaders Tool Kit - Leaders in Heels. [online] Leaders in Heels. Available at: https://leadersinheels.com/career/6-management-styles-and-when-best-to-use-them-the-leaders-tool-kit/ [Accessed 19 Sep. 2017].
9. Cerpa, F., Cáceres, D., Romero-Dapueto, C., Giugliano-Jaramillo, C., Pérez, R., Budini, H., Hidalgo, V., Gutiérrez, T., Molina, J. and Keymer, J. (2015). *Humidification on Ventilated Patients: Heated Humidifications or Heat and Moisture Exchangers?*. [online] The Open Respiratory Medcine Journal. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4541464/ [Accessed 7 Sep. 2017].

10. Change Management Consultant. (2015). *Kurt Lewin 3 Phase Change Management Model and Change Theory*. [online] Available at: http://www.change-management-consultant.com/kurt-lewin.html [Accessed 25 Sep. 2017].
11. City College. (2015). *The 3 Basic Types of Management Styles* | City College. [online] Available at: https://www.citycollege.edu/blog-business/3-basic-types-management-styles/ [Accessed 18 Sep. 2017].
12. Connelly, M. (2016). *The Kurt Lewin Model Of Change*. [online] Change Management Coach. Available at: http://www.change-management-coach.com/kurt_lewin.html [Accessed 17 Sep. 2017].
13. Connelly, M. (2017). *Change Management Models: A Guide to Best Practices.* [online] Change-Management-Coach.com. Available at: http://www.change-management-coach.com/change-management-models.html [Accessed 16 Sep. 2017].
14. Conner, D. (2012). *How to Use Commitment to Understand Resistance* | Conner Partners. [online] Connerpartners.com. Available at: http://www.connerpartners.com/blog-posts-containing-downloadable-tools/how-to-use-commitment-to-understand-resistance [Accessed 19 Sep. 2017].
15. Creasey, T. (2017). *How to Reinforce Change by Celebrating Successes*. [online] Blog.prosci.com. Available at: http://blog.prosci.com/how-to-reinforce-change-by-celebrating-successes [Accessed 18 Sep. 2017].

16. Ctb.ku.edu. (2017). *Assessing Community Needs and Resources* | Section 14. SWOT Analysis: Strengths, Weaknesses, Opportunities, and Threats | Main Section | Community Tool Box. [online] Available at: http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/swot-analysis/main [Accessed 14 Sep. 2017].
17. Ding, C., Zhang, Y., Yang, Z., Wang, J., Jin, A., Wang, W., Chen, R. and Zhan, S. (2017). *Incidence, temporal trend and factors associated with ventilator-associated pneumonia in mainland China: a systematic review and meta-analysis*. [online] BMC Infectious Diseases. Available at: https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-017-2566-7 [Accessed 29 Aug. 2017].
18. Ding, S., Kilickaya, O., Senkal, S., Gajic, O., Hubmayr, R. and Li, G. (2013). *Temporal Trends of Ventilator-Associated Pneumonia Incidence and the Effect of Implementing Health-care Bundles in a Suburban Community*. [online] NCBI. Available at: https://www.ncbi.nlm.nih.gov/pubmed/23907411 [Accessed 29 Aug. 2017].
19. Elmansoury, A. and Hedya, S. (2017). Closed suction system versus open suction. [online] Science Direct. Available at: http://www.sciencedirect.com.ezproxy.leedsbeckett.ac.uk/science/article/pii/S0422763815300911?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb [Accessed 26 Sep. 2017].

20. Ferreira, C., de Souza, D., Cunha, T., Tavares, M., Reis, S., Pedroso, R. and Von Dolinger de Brito Roder, D. (2016). *The effectiveness of a bundle in the prevention of ventilator-associated pneumonia*. [online] Science Direct. Available at: http://www.sciencedirect.com.ezproxy.leedsbeckett.ac.uk/science/article/pii/S1413867016300514?via%3Dihub [Accessed 25 Sep. 2017].
21. Fields, L. (2008). *Oral care intervention to reduce incidence of ventilator-associated pneumonia in the neurologic intensive care unit*. - PubMed - NCBI. [online] Ncbi.nlm.nih.gov. Available at: https://www.ncbi.nlm.nih.gov/pubmed/18856250 [Accessed 30 Aug. 2017].
22. Flinders.libguides.com. (2017). *Search Smart: Search Strategies: Use Keywords, Truncation, Phrases & Subject Headings*. [online] Available at: http://flinders.libguides.com/c.php?g=492364&p=3368135 [Accessed 22 Sep. 2017].
23. Gadani, H., Vyas, A. and Kar, A. (2010). *A study of ventilator-associated pneumonia: Incidence, outcome, risk factors and measures to be taken for prevention.* [online] General OneFile. Available at: http://eds.b.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/pdfviewer/pdfviewer?vid=0&sid=3ecd1392-5057-498c-bccd-351996516dc1%40sessionmgr103 [Accessed 26 Sep. 2017].
24. Guides.lib.purdue.edu. (2017). *Library Guides: Evidence Based Practice: PICO method*. [online] Available at: http://guides.lib.purdue.edu/c.php?g=352904&p=2378098 [Accessed 23 Aug. 2017].

25. Hadda, V., Khilnani, G., Dubey, G., Nallan, R., Kumar, G. and Guleria, R. (2014). *Impact of ventilator associated pneumonia on outcome in patients with chronic obstructive pulmonary disease exacerbation*. [online] Academic Search Complete. Available at: http://eds.b.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/pdfviewer/pdfviewer?vid=0&sid=aec0f661-304e-44bf-8d30-06833d4b1e91%40sessionmgr103 [Accessed 22 Sep. 2017].
26. Han, J. and Liu, Y. (2010). *Effect of ventilator circuit changes on ventilator-associated pneumonia: a systematic review and meta-analysis*. [online] CINAHL. Available at: http://eds.b.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/pdfviewer/pdfviewer?vid=0&sid=df049168-6f95-4195-b44b-5aa99c2fada0%40sessionmgr120 [Accessed 26 Sep. 2017].
27. Harbrecht, B. (2012). *Head of Bed Elevation and Ventilator-Associated Pneumonia.* [online] Respiratory Care. Available at: http://rc.rcjournal.com/content/57/4/659 [Accessed 29 Aug. 2017].
28. Harrison, D. (2014). N*umber of mechanically ventilated patients during 2012*. *ICNARC*, [online] p.2. Available at: https://www.icnarc.org [Accessed 22 Aug. 2017].
29. Harvard Business Review. (2017). *How to deal with resistance to change*. [online] Available at: https://hbr.org/1969/01/how-to-deal-with-resistance-to-change [Accessed 19 Sep. 2017].

30. Healthpei.ca. (2012). *Nursing Education: Setting SMART Goals*. [online] Available at: http://www.healthpei.ca/nursingeducation/index.php3?number=1044217&lang=E [Accessed 29 Aug. 2017].
31. Heathfield, S. (2017). *How to Communicate to Facilitate Change in Employee Actions*. [online] The Balance. Available at: https://www.thebalance.com/communication-in-change-management-1917805 [Accessed 17 Sep. 2017].
32. Heathfield, S. (2017a). *How Are Successful Management Styles Situational?*. [online] The Balance. Available at: https://www.thebalance.com/want-to-adapt-your-management-style-1917890 [Accessed 18 Sep. 2017].
33. Heathfield, S. (2017b). *How to Reduce Employee Resistance to Change in the Workplace*. [online] The Balance. Available at: https://www.thebalance.com/how-to-reduce-employee-resistance-to-change-1918992 [Accessed 19 Sep. 2017].
34. Heathfield, S. (2017c). *How to Spot Resistance to Change in Your Company*. [online] The Balance. Available at: https://www.thebalance.com/what-is-resistance-to-change-1918240 [Accessed 19 Sep. 2017].

35. Hoshijima, H., Kuratani, N., Takeuchi, R., Shiga,, T., Masaki, E., Doi, K. and Matsumoto, N. (2013). Effects of oral hygiene using chlorhexidine on preventing ventilator-associated pneumonia in critical-care settings: A meta-analysis of randomized controlled trials. [online] Science Direct. Available at: http://www.sciencedirect.com.ezproxy.leedsbeckett.ac.uk/science/article/pii/S1991790213000081?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb [Accessed 26 Sep. 2017].
36. Hua, F., Xie, H., Worthington, H., Furness, S., Zhang, Q. and Li, C. (2016). *Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia*. [online] Cochrane Library. Available at: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD008367.pub3/abstract [Accessed 31 Aug. 2017].
37. Hylton, J. (2011). *Filtration of breathing gases*. [online] clinicalfoundations.org. Available at: http://www.clinicalfoundations.org/assets/foundations12.pdf [Accessed 6 Sep. 2017].
38. Institute for Healthcare Improvement. (2012). *How-to Guide: Prevent VentilatorAssociated Pneumonia.* [online] Available at: http://www.chpso.org/sites/main/files/file-attachments/ihi_howtoguidepreventvap.pdf [Accessed 30 Aug. 2017].

39. Kalanuria, A., Zai, W. and Mirski, M. (2014). *Ventilator-associated pneumonia in the ICU*. [online] NCBI. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4056625/ [Accessed 22 Aug. 2017].

40. Kerridge, J. (2012a). *Leading change: 1 - Identifying the issue*. Nursing Times, [online] vol 108 No 4. Available at: http://www.nursingtimes.net. [Accessed 22 Aug. 2017].

41. Kerridge, J. (2012b). *Leading change: 3 - Identifying the issue*. Nursing Times, [online] vol 108 No 6. Available at: http://www.nursingtimes.net. [Accessed 22 Aug. 2017].

42. Kirton, O., DeHaven, B., Morgan, J., Morejon, O. and Civetta, J. (1997). *A Prospective, Randomized Comparison of an In-Line Heat Moisture Exchange Filter and Heated Wire Humidifiers*. Chest, [online] 112(4), pp.1055-1059. Available at: http://journal.chestnet.org/article/S0012-3692(15)47233-2/fulltext [Accessed 6 Sep. 2017].

43. Kranabetter, R., Leier, M., Kammermeier, D., Just, H. and Heuser, D. (2004). *The effects of active and passive humidification on ventilation-associated nosocomial pneumonia*. - PubMed - NCBI. [online] Ncbi.nlm.nih.gov. Available at: https://www.ncbi.nlm.nih.gov/pubmed/14749873 [Accessed 23 Sep. 2017].

44. Kritsonis, A. (2005). *Comparison of Change Theories*. [online] International journal of management, business and administration. Available at: http://www.nationalforum.com/Electronic%20Journal%20Volumes/Kritsonis,%20Alicia%20Comparison%20of%20Change%20Theories%20IJMBA%20V8%20N1%202005.pdf [Accessed 17 Sep. 2017].
45. Leon, A., Davis, L. and Kraemer, H. (2012). *The Role and Interpretation of Pilot Studies in Clinical Research*. [online] HHS Public Access. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3081994/ [Accessed 17 Sep. 2017].
46. Lev, A., Aied, A. and Arshed, S. (2015). *The effect of different oral hygiene treatments on the occurrence of ventilator associated pneumonia (VAP) in ventilated patients*. [online] Journal of Infection Prevention. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5074176/ [Accessed 30 Aug. 2017].
47. Libguides.cdu.edu.au. (2017). *Nursing Guide: Reflective Practice*. [online] Available at: http://libguides.cdu.edu.au/c.php?g=167925&p=3151822 [Accessed 1 Aug. 2017].
48. Libguides.library.curtin.edu.au. (2017). *LibGuides: Systematic Reviews: PICO*. [online] Available at: http://libguides.library.curtin.edu.au/c.php?g=202420&p=4518190 [Accessed 22 Sep. 2017].

49. Lim, K., Kuo, S., JeKo, W., Sheng, W., Chang, Y., Hong, M., Sun, C., Chen, Y. and Chang, S. (2015*). Efficacy of ventilator-associated pneumonia care bundle for prevention of ventilator-associated pneumonia in the surgical intensive care units of a medical center*. [online] Science Direct. Available at: http://www.sciencedirect.com.ezproxy.leedsbeckett.ac.uk/science/article/pii/S1684118213001746?via%3Dihub [Accessed 26 Sep. 2017].

50. Lorente, L., Blot, S. and Rello, J. (2007). *Evidence on measures for the prevention of ventilator-associated pneumonia.* [online] European Respiratory Journal. Available at: http://erj.ersjournals.com/content/30/6/1193#abstract-1 [Accessed 9 Sep. 2017].

51. Lorente, L., Lecuona, M., Galván, R., Ramos, M., Mora, M. and Sierra, A. (2015). *Periodically Changing Ventilator Circuits Is Not Necessary to Prevent Ventilator-Associated Pneumonia When a Heat and Moisture Exchanger Is Used*. [online] Infection Control & Hospital Epidemiology. Available at: https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/periodically-changing-ventilator-circuits-is-not-necessary-to-prevent-ventilatorassociated-pneumonia-when-a-heat-and-moisture-exchanger-is-used/3F4327C5E3B8815B9836F704E720DF67 [Accessed 2 Sep. 2017].

52. Lorente, L., Lecuona, M., Málaga, J., Revert, C., Mora, M. and Sierra, A. (2003). *Bacterial filters in respiratory circuits: an unnecessary cost?* - PubMed - NCBI. [online] Ncbi.nlm.nih.gov. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12973169 [Accessed 6 Sep. 2017].

53. Medtronic.com. (2017). *Ventilator Filters | Medtronic.* [online] Available at: http://www.medtronic.com/covidien/en-us/products/ventilator-filters.html [Accessed 6 Sep. 2017].
54. Mind Tools. (2013). *Lewin's Change Management Model Understanding the Three Stages of Change.* [online] Available at: https://edisciplinas.usp.br/pluginfile.php/1769903/mod_resource/content/2/texto%2007%20-%20Lewins%20Change%20Management%20Model%20-%20Change%20Management%20Training%20from%20MindTools.com.pdf [Accessed 18 Sep. 2017].
55. Mindtools.com. (2017). *SWOT analysis: Discover new opportunities, manage and eliminate threats.* [online] Available at: https://www.mindtools.com/pages/article/newTMC_05.htm [Accessed 14 Sep. 2017].
56. Mindtools.com. (2017). *The change curve: Accelerating change, and improving its likelihood of success.* [online] Available at: https://www.mindtools.com/pages/article/newPPM_96.htm [Accessed 19 Sep. 2017].
57. Morrison, M. (2014). *Kurt Lewin change theory and three step model - Unfreeze-Change-Freeze*. [online] RapidBI. Available at: https://rapidbi.com/kurt-lewin-three-step-change-theory/ [Accessed 18 Sep. 2017].

58. Ncbi.nlm.nih.gov. (2010). *AARC Clinical Practice Guidelines. Endotracheal suctioning of mechanically ventilated patients with artificial airways 2010*. [online] Available at: https://www.ncbi.nlm.nih.gov/pubmed/20507660 [Accessed 31 Aug. 2017].
59. Nhs.uk. (2016). *Intensive care - NHS Choices.* [online] Available at: http://www.nhs.uk/conditions/Intensive-care/Pages/Introduction.aspx [Accessed 21 Aug. 2017].
60. Niël-Weise, B., Gastmeier, P., Kola, A., Vonberg,, R., Wille,, J. and Van den Broek, P. (2011). *An evidence-based recommendation on bed head elevation for mechanically ventilated patients.* [online] BioMed Central. Available at: https://ccforum-biomedcentral-com.ezproxy.leedsbeckett.ac.uk/articles/10.1186/cc10135 [Accessed 26 Sep. 2017].
61. O'Keefe-McCarthy, S., Santiago, C. and Lau, G. (2008). *Ventilator-Associated Pneumonia Bundled Strategies: An Evidence-Based Practice*. [online] CINAHL. Available at: http://eds.b.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/pdfviewer/pdfviewer?vid=0&sid=b4083d26-a4e6-44bf-a172-57f35d324138%40sessionmgr103 [Accessed 26 Sep. 2017].
62. Okgün Alcan, A., Demir Korkmaz, F. and Uyar, M. (2016). Prevention of ventilator-associated pneumonia: Use of the care bundle approach. [online] Science Direct. Available at: http://www.sciencedirect.com.ezproxy.leedsbeckett.ac.uk/science/article/pii/S0196655316304916?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb [Accessed 26 Sep. 2017].

63. Oxford Dictionaries. (2017). *Definition of humidity in English by Oxford Dictionaries.* [online] Available at: https://en.oxforddictionaries.com/definition/humidity [Accessed 6 Sep. 2017].

64. Parisi, M., Gerovasili, V., Dimopoulos, S., Goga, C., Perivolioti, E., Argyropoulou, A., Routsi, C., Tsiodras, S. and Nanas, S. (2016). *Use of ventilator bundle and staff education to decrease Ventilator- Associated Pneumonia in intensive care patients.* [online] CINAHL. Available at: http://eds.b.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/pdfviewer/pdfviewer?vid=0&sid=e577c14d-f329-4837-a1a4-60c807f6a1ac%40sessionmgr101 [Accessed 26 Sep. 2017].

65. Pillai, M. (2011). *5 Different leadership styles to implement* |. [online] RunApptivo. Available at: http://runapptivo.apptivo.com/5-different-leadership-styles-to-implement-4676.html [Accessed 19 Sep. 2017].

66. PMI. (2014). *The benefits of a pilot study before a GLP study*. [online] Available at: http://www.pmipreclinical.com/benefits-pilot-study-glp-study/ [Accessed 17 Sep. 2017].

67. Rcjournal.com. (2003). *Care of the ventilator circuit and its relation to Ventilator–Associated Pneumonia.* [online] Available at: http://www.rcjournal.com/cpgs/09.03.0869.html [Accessed 2 Sep. 2017].

68. Rouse, M. (2014). *What is leadership? - Definition from WhatIs.com*. [online] SearchCIO. Available at: http://searchcio.techtarget.com/definition/leadership [Accessed 19 Sep. 2017].

69. Sole, M., Bennett, M. and Ashworth, S. (2015). *Clinical indicators for endotracheal suctioning in adult patients receiving mechanical ventilation*. [online] Pulmonary Critical Care. Available at: http://eds.a.ebscohost.com.ezproxy.leedsbeckett.ac.uk/eds/pdfviewer/pdfviewer?vid=0&sid=469eb671-a985-4599-95ce-d25cbce80cc2%40sessionmgr4010 [Accessed 31 Aug. 2017].
70. Speck, K., Rawat, N., Weiner, N., Tujuba, H., Farley, D. and Berenholtz, S. (2016). *A systematic approach for developing a ventilator-associated pneumonia prevention bundle*. [online] Science Direct. Available at: http://www.sciencedirect.com.ezproxy.leedsbeckett.ac.uk/science/article/pii/S0196655315012900?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb [Accessed 26 Sep. 2017].
71. Strategies for managing change.com. (2017). *Kurt Lewin - The Freeze - Unfreeze Change Model.* [online] Available at: http://www.strategies-for-managing-change.com/kurt-lewin.html [Accessed 16 Sep. 2017].
72. The Free Dictionary.com. (2009). *Ventilator bundle*. [online] Available at: http://medical-dictionary.thefreedictionary.com/ventilator+bundle [Accessed 29 Aug. 2017].
73. TheFreeDictionary.com. (2012). *Nebulizer*. [online] Available at: http://medical-dictionary.thefreedictionary.com/nebulizer [Accessed 9 Sep. 2017].
74. Torben, R. (2015). *What is resistance to change* - Employee resistance. [online] Meliorate. Available at: https://www.torbenrick.eu/blog/change-management/resistance-to-change-in-organisations/ [Accessed 19 Sep. 2017].

75. Transforming Health. (2014). *Why did we need to change?* - Transforming Health. [online] Available at: http://transforminghealth.sa.gov.au/transforming-health/why-do-we-need-to-change/ [Accessed 16 Sep. 2017].
76. Wagh, H. and Acharya, D. (2009). *Ventilator Associated Pneumonia – an overview* | British Journal of Medical Practitioners. [online] Bjmp.org. Available at: http://www.bjmp.org/content/ventilator-associated-pneumonia-overview [Accessed 22 Aug. 2017].
77. Wang, L., Li, X., Yang, Z., Tang, X., Yuan, Q., Deng, L. and Sun, X. (2016). *Semi-recumbent position versus supine position for the prevention of ventilator-associated pneumonia in adults requiring mechanical ventilation*. [online] Cochrane Library. Available at: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009946.pub2/abstract;jsessionid=DC1B02F6690974303F7CA2C2E3F87AED.f02t01 [Accessed 29 Aug. 2017].
78. Weinstein, R., Bonten, M., Kollef, M. and Hall, J. (2004). *Risk Factors for Ventilator-Associated Pneumonia: From Epidemiology to Patient Management*. [online] Clinical Infectious Disease. Available at: https://academic.oup.com/cid/article/38/8/1141/2118237/Risk-Factors-for-Ventilator-Associated-Pneumonia [Accessed 29 Aug. 2017].
79. WHO. (2002). *Prevention of hospital-acquired infections*. [online] Available at: http://www.who.int/csr/resources/publications/whocdscsreph200212.pdf [Accessed 21 Aug. 2017].

80. Wilkes, A., Benbough, J., Speight, S. and Harmer, M. (2000). *The bacterial and viral filtration performance of breathing system filters*. - PubMed - NCBI. [online] Ncbi.nlm.nih.gov. Available at: https://www.ncbi.nlm.nih.gov/pubmed/10792138 [Accessed 6 Sep. 2017].
81. Wilkes.libguides.com. (2017). *LibGuides: Evidence-based practice and information mastery: Clinical questions and the PICO method*. [online] Available at: https://wilkes.libguides.com/c.php?g=191942&p=1266431 [Accessed 22 Sep. 2017].
82. Wunsch, H., Linde-Zwirble, W., Angus, D., Hartman, M., Milbrandt, E. and Kahn, J. (2010). *The epidemiology of mechanical ventilation use in the United States. - PubMed - NCBI*. [online] Ncbi.nlm.nih.gov. Available at: https://www.ncbi.nlm.nih.gov/pubmed/20639743 [Accessed 21 Aug. 2017].
83. Www2.indwes.edu. (2013). *Boolean Operators and Search Strategies* -- OCLS (800)521-1848. [online] Available at: https://www2.indwes.edu/boole.htm [Accessed 22 Sep. 2017].

APPENDIX 1 - ACTION PLAN

1ST IMPLEMENTATION PHASE

STEPS / GOAL	ACTION STEPS / DESCRIPTION / STAKEHOLDERS INVOLVED	ESTIMATED TIME
1. Gathering information	• Online literature search by the author.	1 week
2. Make a survey of existing and missing facilities	• Identify available equipment recommended by literature search by the author. • Identify equipment not in line with literature recommendations by the author. • List equipment that will benefit implementation of the project.	1- 2 weeks
3. Share change proposal	• Communicate change proposal to the charge nurse. • Share report of available equipment as well as those needed to implement the change to the charge nurse	1- 2 weeks
4. Formation of a project team	• Formation of a team comprising of staff nurses and the charge nurse who will help in the design and implementation of the project. • The members chosen should be motivated in bringing about the change.	1 week
5. Individual brainstorming session with the nurse staffs and identifying resistance	• The project team to meet all staffs individually in the working place to test their knowledge on VAP. • Investigate on their willingness to change and identify any resistance.	2 weeks
6. Overcoming resistance	• Try overcoming any resistance to change from the nurse staffs by holding regular meeting with them by the project team. • Continue nurse education and training by the author and the nurse in charge	1 month

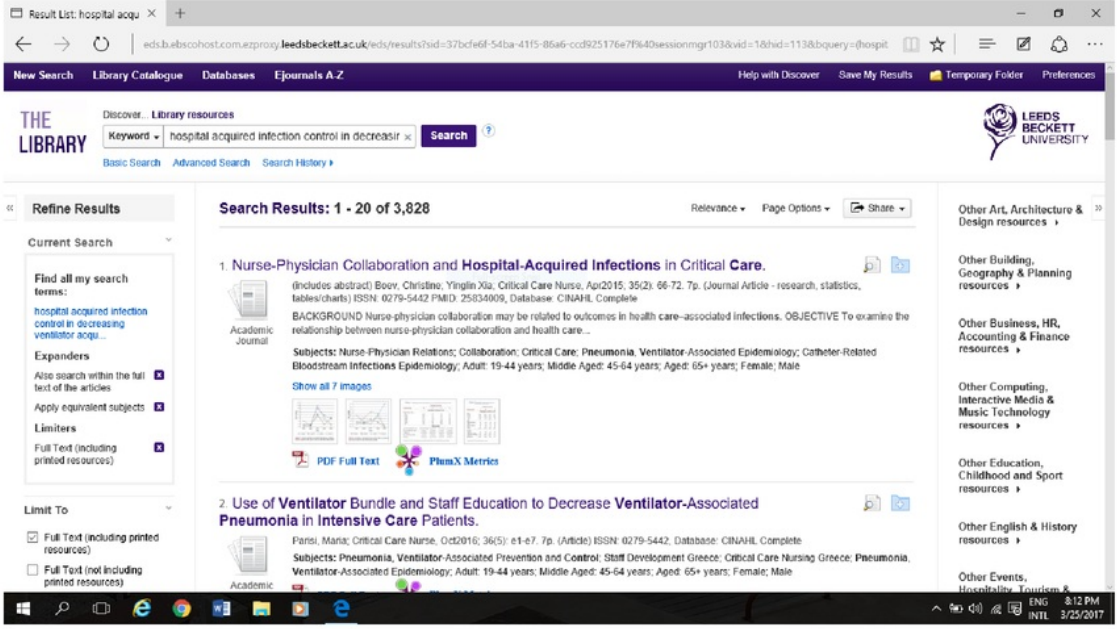
7. Give training/ education/ demonstration	• The charge nurse to identify place for the training session and demonstration sessions. • The charge nurse to propose date and time for training session to be held. • The charge nurse to explore possibility to find other resource persons to give lectures such as the anesthetist or the physician.	4 months
8. Pilot test	• A pilot test to be carried out upon successful training program. • Recording of any feedback from the nurses by the project team • Assessing any progress in terms of VAP by the project team and doctors • Weekly meeting with project team as well as with nurse staff • Rigorous monitoring of adherence with the care bundle by the project team	1 month
9. Identify shortcomings and overcoming them	• All shortcomings or problems faced during the pilot test to be noted and work upon.	1 month
10. Implement the change	• Use of checklist to be used by all nurses • Monitoring of adherence to the checklist by the project team • Continuous nursing education and training alongside • Continuous meeting with project team to address any feedback from nurses • Assessing progress of the care bundle by measuring VAP incidence	6 months
11. Stabilizing the project	• Continuous monitoring of adherence to the care bundle by the project team • Continuous education and training by self, the nurse in charge and at times doctors	

	• Continuous recording of feedback from the nurses by the project team	

When phase 1 implementation will be stabilized, then the phase 2 implementation of the FAST HUG care bundle will be introduced using the same steps used for phase 1.

APPENDIX 2 - SEARCH STRATEGY – SNAPSHOTS.

The initial title of the dissertation was, “Hospital acquired infection control in decreasing the incidence of VAP.” This title was entered as a basic search in the Discovery online library and hit 3828 articles (see snapshot 1).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New Search
Library Catalogue
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Ejournals A-Z
Help with Discover
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Discover... Library resources
Keyword
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LEEDS BECKETT UNIVERSITY
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Other Business, HR, Accounting & Finance resources
Other Computing, Interactive Media & Music Technology resources
Other Education, Childhood and Sport resources
Other English & History resources
Other Events, Hospitality, Tourism &
ENG INTL
8:12 PM
3/25/2017

Keyword: hospital acquired infection control in decreasir

Find all my search terms: hospital acquired infection control in decreasing ventilator acqu...

Expanders

Also search within the full text of the articles ☒

Apply equivalent subjects ☒

Limiters

Full Text (including printed resources) ☒

Limit To

☑ Full Text (including printed resources)

☐ Full Text (not including printed resources)

Search Results: 1 - 20 of 3,828

1. Nurse-Physician Collaboration and **Hospital-Acquired Infections** in Critical **Care**.

Academic Journal

(includes abstract) Boev, Christine; Yinglin Xia; Critical Care Nurse, Apr2015; 35(2): 66-72. 7p. (Journal Article - research, statistics, tables/charts) ISSN: 0279-5442 PMID: 25834009, Database: CINAHL Complete

BACKGROUND Nurse-physician collaboration may be related to outcomes in health care–associated infections. OBJECTIVE To examine the relationship between nurse-physician collaboration and health care...

Subjects: Nurse-Physician Relations; Collaboration; Critical Care; **Pneumonia**, **Ventilator**-Associated Epidemiology; Catheter-Related Bloodstream **Infections** Epidemiology; Adult: 19-44 years; Middle Aged: 45-64 years; Aged: 65+ years; Female; Male

Show all 7 images

PDF Full Text PlumX Metrics

2. Use of **Ventilator** Bundle and Staff Education to Decrease **Ventilator**-Associated **Pneumonia** in **Intensive Care** Patients.

Academic

Parisi, Maria; Critical Care Nurse, Oct2016; 36(5): e1-e7. 7p. (Article) ISSN: 0279-5442, Database: CINAHL Complete

Subjects: **Pneumonia**, **Ventilator**-Associated Prevention and **Control**; Staff Development Greece; Critical Care Nursing Greece; **Pneumonia**, **Ventilator**-Associated Epidemiology; Adult: 19-44 years; Middle Aged: 45-64 years; Aged: 65+ years; Female; Male

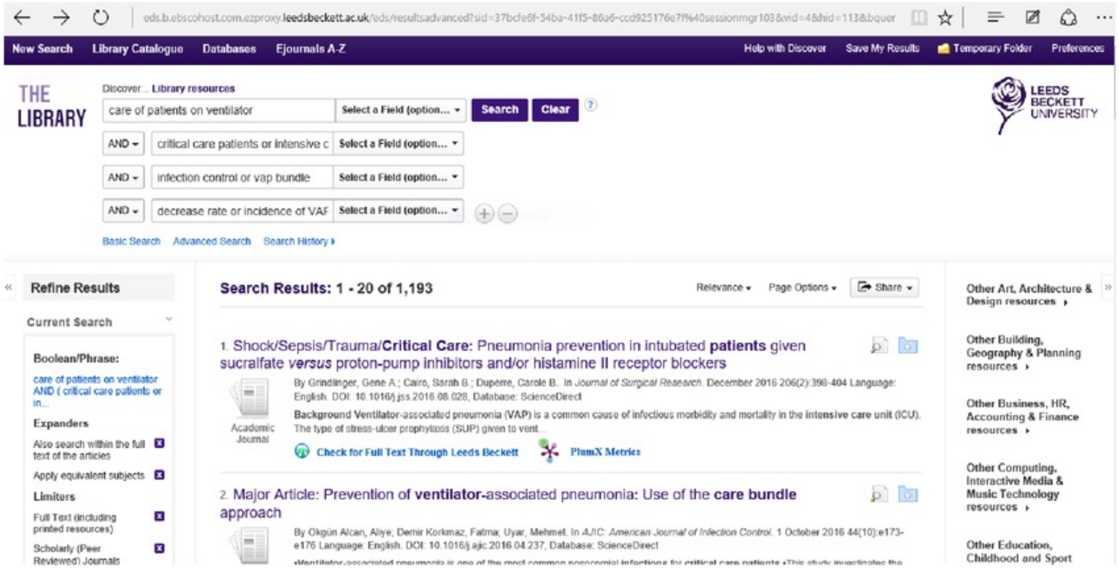
Snapshot 1

After scanning the first 20 articles by title, the author wanted to be more specific and changed his title to, “Care of patients on MV in decreasing the incidence of VAP in the ICU.” And went for an advanced search. This time, only the key words, abbreviation, and synonyms were entered so as to be sure not to miss important articles as advised by (Apha Plus Centre, 2004). The following key terms, synonyms and abbreviation were entered and hit 1193 articles (see Table 1 and snapshot 2).

CARE OF PATIENTS ON VENTILATOR

AND	Critical care patients “OR” intensive care patients
AND	Infection control “OR” VAP bundle
AND	Decreased rate “OR” incidence of VAP

Table 1- showing key terms, synonyms, abbreviation entered



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Discover... Library resources

care of patients on ventilator | Select a Field (option...

AND | critical care patients or intensive c | Select a Field (option...

AND | infection control or vap bundle | Select a Field (option...

AND | decrease rate or incidence of VAF | Select a Field (option...

Current Search

Boolean/Phrase:
care of patients on ventilator AND (critical care patients or in...

Expanders
Also search within the full text of the articles ☒
Apply equivalent subjects ☒

Limiters
Full Text (including printed resources) ☒
Scholarly (Peer Reviewed) Journals ☒

Search Results: 1 - 20 of 1,193

1. Shock/Sepsis/Trauma/**Critical Care:** Pneumonia prevention in intubated **patients** given sucralfate *versus* proton-pump inhibitors and/or histamine II receptor blockers

By Grindlinger, Gene A.; Cairo, Sarah B.; Duperre, Carole B.. In *Journal of Surgical Research*. December 2016 206(2):398-404 Language: English. DOI: 10.1016/j.jss.2016.08.028, Database: ScienceDirect

Background Ventilator-associated pneumonia (VAP) is a common cause of infectious morbidity and mortality in the intensive care unit (ICU). The type of stress-ulcer prophylaxis (SUP) given to vent...

2. Major Article: Prevention of **ventilator**-associated pneumonia: Use of the **care bundle** approach

By Okgün Alcan, Aliye; Demir Korkmaz, Fatma; Uyar, Mehmet. In *AJIC: American Journal of Infection Control*. 1 October 2016 44(10):e173-e176 Language: English. DOI: 10.1016/j.ajic.2016.04.237, Database: ScienceDirect

Other Art, Architecture & Design resources

Other Building, Geography & Planning resources

Other Business, HR, Accounting & Finance resources

Other Computing, Interactive Media & Music Technology resources

Other Education, Childhood and Sport

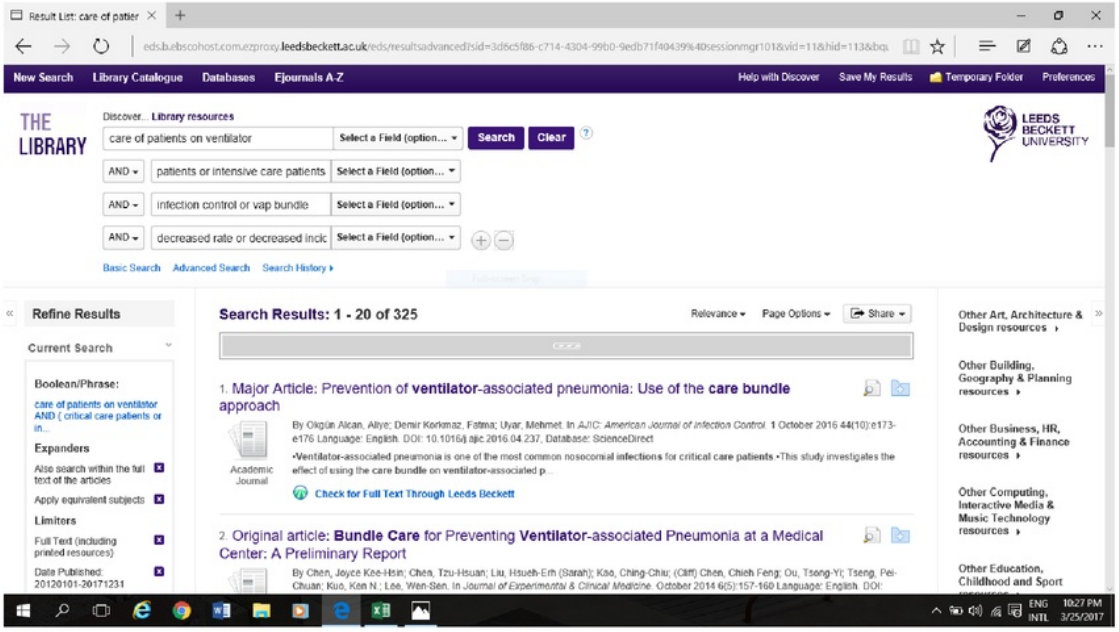
Snapshot 2

Several combinations of the several synonyms were entered. The next snapshot shows one result obtained when in the last field, “ incidence of vap” was changed to “decrease incidence of VAP.” The search hit 325 article (see table 2 and snapshot 3). Scanning of 20 articles by tile was again done and 2 articles selected for further reading.

CARE OF PATIENTS ON VENTILATOR

AND	Critical care patients “OR” intensive care patients
AND	Infection control “OR” VAP bundle
AND	Decreased rate “OR” **decreased incidence of VAP**

Table 2


Result List: care of patier
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New Search
Library Catalogue
Databases
Ejournals A-Z
Help with Discover
Save My Results
Temporary Folder
Preferences
THE LIBRARY
LEEDS BECKETT UNIVERSITY
Discover... Library resources
Search
Clear
Basic Search
Advanced Search
Search History
Refine Results
Relevance
Page Options
Share
Other Art, Architecture & Design resources
Other Building, Geography & Planning resources
Other Business, HR, Accounting & Finance resources
Other Computing, Interactive Media & Music Technology resources
Other Education, Childhood and Sport

care of patients on ventilator | Select a Field (option...

AND | patients or intensive care patients | Select a Field (option...

AND | infection control or vap bundle | Select a Field (option...

AND | decreased rate or decreased incic | Select a Field (option...

Search Results: 1 - 20 of 325

Current Search

Boolean/Phrase:
care of patients on ventilator AND (critical care patients or in...

Expanders
Also search within the full text of the articles ☒
Apply equivalent subjects ☒

Limiters
Full Text (including printed resources) ☒
Date Published: 20120101-20171231 ☒

1. Major Article: Prevention of **ventilator**-associated pneumonia: Use of the **care bundle** approach

Academic Journal

By Olgün Alcan, Aliye; Demir Korkmaz, Fatma; Uyar, Mehmet. In *AJIC: American Journal of Infection Control*. 1 October 2016 44(10):e173-e176 Language: English. DOI: 10.1016/j.ajic.2016.04.237, Database: ScienceDirect

•Ventilator-associated pneumonia is one of the most common nosocomial **infections** for **critical care patients**.•This study investigates the effect of using the **care bundle** on **ventilator**-associated p...

Check for Full Text Through Leeds Beckett

2. Original article: **Bundle Care** for Preventing **Ventilator**-associated Pneumonia at a Medical Center: A Preliminary Report

By Chen, Joyce Kee-Hsin; Chen, Tzu-Hsuan; Liu, Hsueh-Erh (Sarah); Kao, Ching-Chiu; (Cliff) Chen, Chieh Feng; Ou, Tsong-Yi; Tseng, Pei-Chuan; Kuo, Ken N.; Lee, Wen-Sen. In *Journal of Experimental & Clinical Medicine*. October 2014 6(5):157-160 Language: English. DOI:

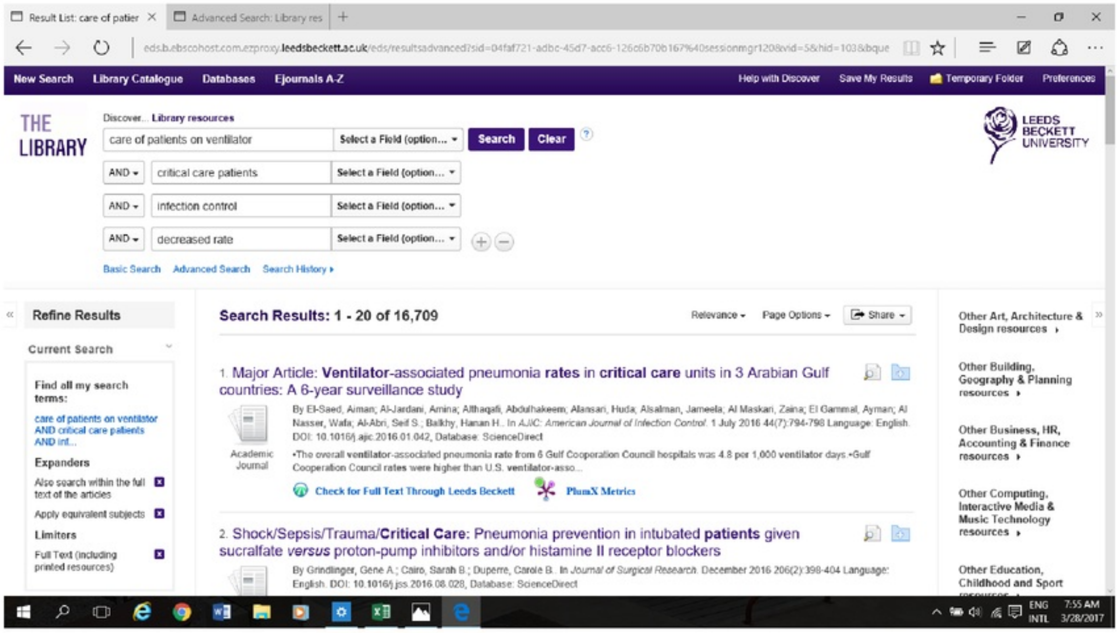
ENG INTL 10:27 PM 3/25/2017

Snapshot 3

The next snapshot shows another combination of terms entered. This time the search hit 16706 articles. See table 3 and snapshot 4.

AND	Critical care patients
AND	Infection control
AND	Decreased rate

Table 3



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Discover... Library resources

care of patients on ventilator — Select a Field (option...

AND — critical care patients — Select a Field (option...

AND — infection control — Select a Field (option...

AND — decreased rate — Select a Field (option...

Current Search

Find all my search terms:

care of patients on ventilator AND critical care patients AND int...

Expanders

Also search within the full text of the articles ☒

Apply equivalent subjects ☒

Limiters

Full Text (including printed resources) ☒

Search Results: 1 - 20 of 16,709

1. Major Article: **Ventilator**-associated pneumonia **rates** in **critical care** units in 3 Arabian Gulf countries: A 6-year surveillance study

Academic Journal

By El-Saed, Aiman; Al-Jardani, Amina; Althaqafi, Abdulhakeem; Alansari, Huda; Alsalman, Jameela; Al Maskari, Zaina; El Gammal, Ayman; Al Nasser, Wafa; Al-Abri, Seif S.; Balkhy, Hanan H.. In *AJIC: American Journal of Infection Control*. 1 July 2016 44(7):794-798 Language: English. DOI: 10.1016/j.ajic.2016.01.042, Database: ScienceDirect

•The overall **ventilator**-associated pneumonia **rate** from 6 Gulf Cooperation Council hospitals was 4.8 per 1,000 **ventilator** days.•Gulf Cooperation Council rates were higher than U.S. **ventilator**-asso...

Check for Full Text Through Leeds Beckett — PlumX Metrics

2. Shock/Sepsis/Trauma/**Critical Care**: Pneumonia prevention in intubated **patients** given sucralfate *versus* proton-pump inhibitors and/or histamine II receptor blockers

By Grindlinger, Gene A.; Cairo, Sarah B.; Duperre, Carole B.. In *Journal of Surgical Research*. December 2016 206(2):398-404 Language: English. DOI: 10.1016/j.jss.2016.08.028, Database: ScienceDirect

Snapshot 4

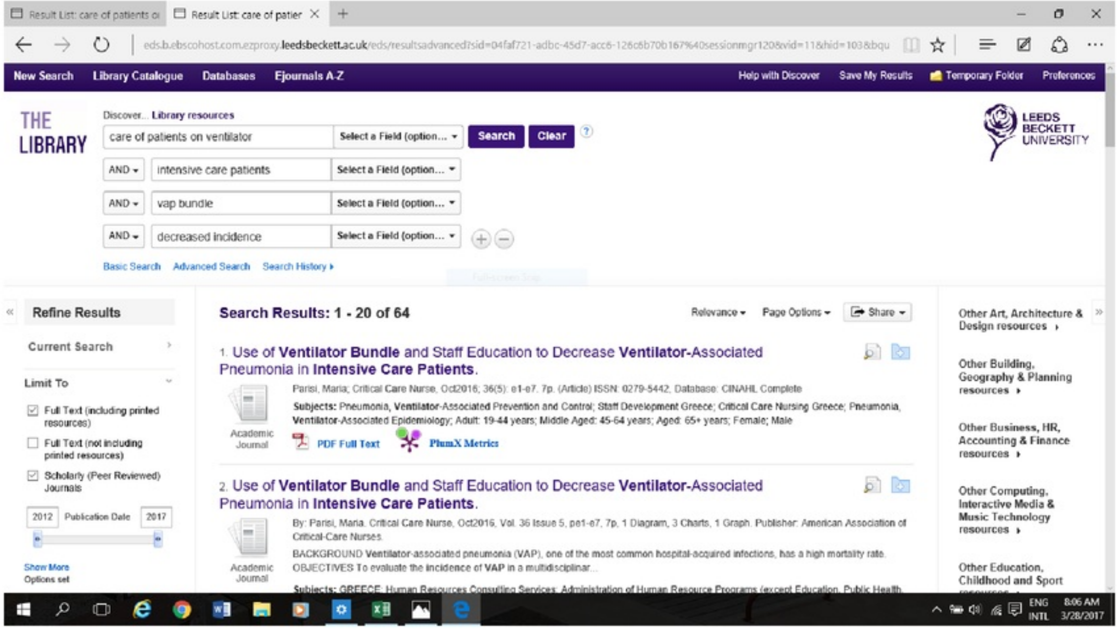
The next snapshot shows new combinations of synonyms and the use of inclusion as well as exclusion criteria which narrowed the search. The search hit 64 articles (see table 4 and snapshot 5). The 64 articles were scanned by abstract and 10 articles were selected. The following limiters were applied.

1. Full text
2. Scholarly (peer reviewed) journals
3. Articles between year 2012 to 2017
4. English language

CARE OF PATIENTS ON VENTILATOR

AND	Intensive care patients
AND	Infection control
AND	Decreased rate

Table 4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Academic Journal
Show More
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Other Building, Geography & Planning resources
Other Business, HR, Accounting & Finance resources
Other Computing, Interactive Media & Music Technology resources
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care of patients on ventilator

AND intensive care patients

AND vap bundle

AND decreased incidence

☑ Full Text (including printed resources)

☐ Full Text (not including printed resources)

☑ Scholarly (Peer Reviewed) Journals

2012 Publication Date 2017

Search Results: 1 - 20 of 64

1. Use of **Ventilator Bundle** and Staff Education to Decrease **Ventilator**-Associated Pneumonia in **Intensive Care Patients**.
Parisi, Maria; Critical Care Nurse, Oct2016; 36(5): e1-e7. 7p. (Article) ISSN: 0279-5442, Database: CINAHL Complete
Subjects: Pneumonia, **Ventilator**-Associated Prevention and Control; Staff Development Greece; Critical Care Nursing Greece; Pneumonia, **Ventilator**-Associated Epidemiology; Adult: 19-44 years; Middle Aged: 45-64 years; Aged: 65+ years; Female; Male

2. Use of **Ventilator Bundle** and Staff Education to Decrease **Ventilator**-Associated Pneumonia in **Intensive Care Patients**.
By: Parisi, Maria. Critical Care Nurse, Oct2016, Vol. 36 Issue 5, pe1-e7, 7p, 1 Diagram, 3 Charts, 1 Graph. Publisher: American Association of Critical-Care Nurses.
BACKGROUND **Ventilator**-associated pneumonia (VAP), one of the most common hospital-acquired infections, has a high mortality rate. OBJECTIVES To evaluate the incidence of **VAP** in a multidisciplinar...
Subjects: GREECE; Human Resources Consulting Services; Administration of Human Resource Programs (except Education, Public Health

Snapshot 5

The following table shows the some of the different synonyms that were used as alternatives to the key terms during the search process.

TITLE: **Care of patients on mechanical ventilation in decreasing the incidence of ventilator acquired pneumonia in the intensive care unit**	
KEY TERMS	**SYNONYMS USED AS COMBINATION FOR SEARCH**
Patient	ICU patients, Intensive care patients, Critically ill patients
Ventilator associated pneumonia	Ventilator acquired pneumonia, VAP care bundle, VAP bundle, Ventilator bundle, Ventilator care bundle, Ventilator acquired infection
Intensive care unit	ICU or Intensive Care Unit, ITU or Intensive Therapy Unit or Intensive Treatment Unit, CCU or Critical Care Unit, critically ill patients
Incidence of VAP	Decreased incidence of VAP, Decreased rate of VAP, Decreased VAP rate.

Table 5

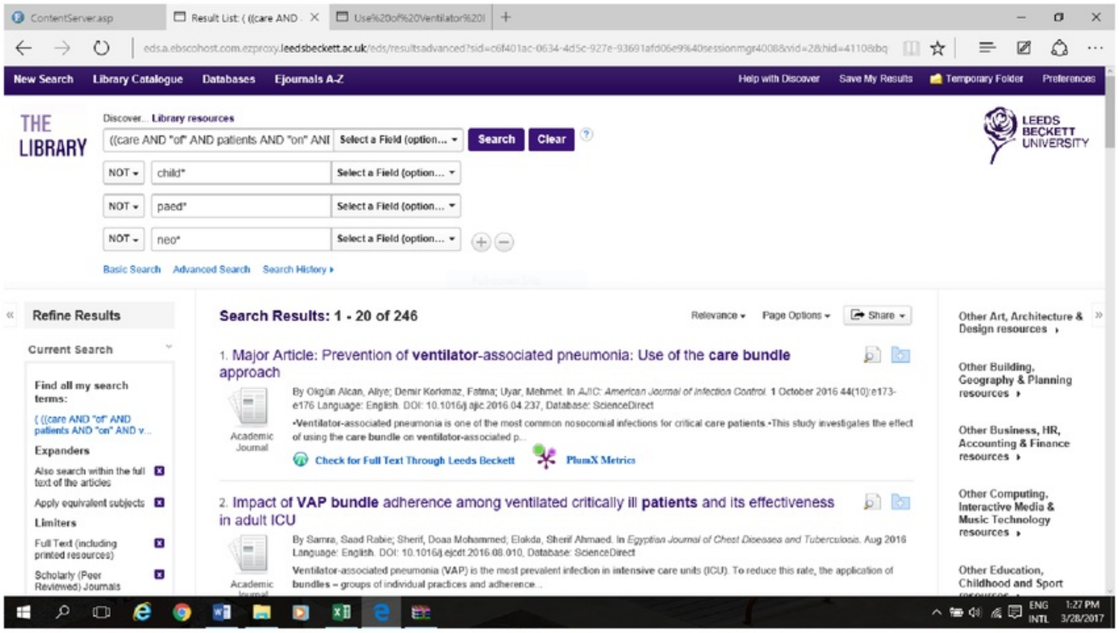
BOOLEAN LOGIC

NOT, OR, AND are operators from the Boolean logic used in databases to make a specific search, eliminating those results not needed for a project, thus refining and making the search more specific (Www2.indwes.edu, 2013).

The Boolean logic operator “OR” was used in the following example. To find articles with the key term “Intensive care unit” or “Critical Care Unit.” Using the “OR” in the search allows the database to retrieve all articles with either one of the key terms.

The Boolean logic operator “AND” was used in the following example. Finding articles with the key terms, “Intensive Care Unit” and “Ventilator Acquired Pneumonia,” allows the database search to retrieve those articles with both key terms in the same articles.

For the Boolean logic “NOT”. Its use was helpful in eliminating those fields or articles which were not needed or relevant to the author’s search. To follow is an example of a search with a Boolean logic “NOT.”



((care AND "of" AND patients AND "on" ANI — Select a Field (option...

NOT — child* — Select a Field (option...

NOT — paed* — Select a Field (option...

NOT — neo* — Select a Field (option...

Search Results: 1 - 20 of 246

1. Major Article: Prevention of **ventilator**-associated pneumonia: Use of the **care bundle** approach

By Olgün Alcan, Aliye; Demir Korkmaz, Fatma; Uyar, Mehmet. In *AJIC: American Journal of Infection Control*. 1 October 2016 44(10):e173-e176 Language: English. DOI: 10.1016/j.ajic.2016.04.237, Database: ScienceDirect

•Ventilator-associated pneumonia is one of the most common nosocomial infections for critical care patients.•This study investigates the effect of using the **care bundle** on **ventilator**-associated p...

2. Impact of **VAP bundle** adherence among ventilated critically ill **patients** and its effectiveness in adult ICU

By Samra, Saad Rabie; Sherif, Doaa Mohammed; Elokda, Sherif Ahmaed. In *Egyptian Journal of Chest Diseases and Tuberculosis*. Aug 2016 Language: English. DOI: 10.1016/j.ejcdt.2016.08.010, Database: ScienceDirect

Ventilator-associated pneumonia (VAP) is the most prevalent infection in intensive care units (ICU). To reduce this rate, the application of **bundles** – groups of individual practices and adherence...

Snapshot 6

The population studied in the author's research work, was adult patients only. So to exclude research which were done in the paediatric field, the Boolean logic "NOT" was useful. By applying "NOT" before the terms "children," "paediatric," and "neonatal," this results in retrieving articles without these terms in them. Furthermore, the author used the search technique called truncation (Flinders.libguides.com, 2017). This technique allows identifying word beginning with the same letters by adding an asterisk "*" after the search word. See **table 6** for example taken in snapshot 6. In this example all the possible word outcomes used for truncation were excluded from the search.

TERMS FOR TRUNCATION (*)	POSSIBLE WORDS OUTCOMES
Child*	Child or Children or Childcare or Childhood
Paed*	Paediatric (s) or Paediatrician(s)
Neo*	Neonatal or Neonatology or Neonate or Neonatologist(s) or Neoplastic

Table 6

PICO METHOD

The PICO method is a useful tool for the formulation of search question, for an effective systematic search (Libguides.library.curtin.edu.au, 2017). It helps on focusing on the relevant and precise information needed (Wilkes.libguides.com, 2017). **Table 7** shows example of how the PICO method was used to make a search.

P	I	C	O
Patient or Population or Problem	**Intervention or Exposure**	**Comparison**	**Outcome**
Intensive care patients	VAP bundle of care	Operating theatre	Decreased incidence of VAP

Table 7

DATABASE

The databases used were:

1. Discovery online library.
2. Ebsco host
3. Google

The Discovery online library was the first choice database for this work with regards to its huge variety of high quality academic research articles as well as to its well organized options included in the database for a more focus search. Furthermore, this database is updated regularly and provided up to date articles. The same observation was made with the Ebsco database which however was limited in terms of relevant material needed by the author. However, at some pointing time of the year, it was quite difficult to access both the Discovery and the Ebsco library. This was due to the poor and slow connectivity of the internet in the Island. The author to respect the timeframe for this work had no choice that to collect the rest of the research articles on the google databases. However, even though some of the articles were not peer reviewed, attention was taken by the author to align the main ideas of these articles, with the study materials gained in this module as well as the topic of the dissertation in general. This was done so that the information taken from google and included in this dissertation meet evidence based research.

APPENDIX 3 – CRITICAL APPRAISAL

TITLE & YEAR	AUTHOR	METHODOLOGY	AIMS AND POPULATION	FINDINGS	CRITICAL APPRAISAL
The effectiveness of a bundle in the prevention of VAP 2016	Cleria Rodrigue z et al.	Studied VAP incidence before and after implementation of FAST HUG care bundle in an ICU	To assess efficacy of the care bundle in decreasing VAP in adult and MV patients for more than 48 hours	Decreased incidence of VAP, antibiotic use, mortality rate, hospital cost and quality care	Ideal for its implementation because it does not add additional pressure on staff as well as additional hospital budget for its implementation
Prevention of VAP: Use of the care bundle approach 2016	Aliye Okgun Alcan, Fatma Demir Korkmaz and Mehmet Uyar	Quasiexperimental study in 3 phases. Adherence of nurses to care bundle, providing education to nurses, effect of vap care bundle adherence on VAP rate.	Investigating the implementation of a care bundle on VAP rate. Adult patients on MV > 48 hours selected for study.	VAP care bundle adherence improved after education was provided. VAP rate decreased	This study highlighted the importance of providing education in decreasing the incidence of VAP.
Efficacy of VAP care bundle for prevention of VAP in the surgical ICU of a medical center 2015	Kim-Peng Lim et al.	Assessing VAP incidence after implementation of 6 items from a VAP care bundle in 5 ICUs in Taiwan from year 2006 to 2013.	Assessing the impact of VAP care bundle in clinical setting. Adult patient on MV for > 48 hours included for study	Implementation of VAP care bundle decreases incidence of VAP at SICU	Success of the study involve multidisciplinary teamwork, education, comprehensive checklist to improve care compliance.

TITLE &YEAR	AUTHOR	METHODOLOGY	AIMS AND POPULATION	FINDINGS	CRITICAL APPRAISAL
VAP bundle strategies: An evidence-based practice 2008	Sheila O'Keefe-Mc Carthy, Cecilia Santiago, Gemma Lau	Electronic search in different databases for quantitative study in peer reviewed journals for year 1997-2007. 6 studies selected and compared to establish consensus	To provide a literature review on VAP bundle practices. Describe cause and risk, finding a framework to implement VAP bundle into clinical setting and identify areas for further research and practice	VAP care bundle practices decrease: VAP rates, ventilator days, ICU days, mortality rate.	Stressed on the importance of having a nurse led intervention leader for successful implementation of VAP care bundle in practice.
A systematic approach for developing a VAP prevention bundle 2016	Kathleen Speck et al.	Potential intervention obtained from review of current guidelines and literatures. Then a 2 step Delphi method was implemented guided by a technical expert panel.	To develop a new VAP care bundle using a systematic approach including the most important intervention	65 interventions identified narrowed to 19 that included 5 process and 14 structural measures	Choosing the right intervention to include in the clinical setting increases likelihood that nurses will adhere to the care bundle.
The effect of active and passive humidification on ventilator nosocomial pneumonia . 2004	Kranabetter et al.	An open non randomized cohort study in 3585 patients assessing both active and passive humidification.	To assess how humidification strategy impact on the incidence of VAP.	Passive humidification is associated with greater reduction in VAP incidence.	In the author's area of practice, the passive type of humidification system is in use. Is a positive aspect for future implementation of care bundle.

TITLE & YEAR	AUTHOR	METHODOLOGY	AIMS AND POPULATION	FINDINGS	CRITICAL APPRAISAL
Use of ventilator bundle and staff education to decrease VAP in intensive care patients. 2016	Maria Parisi et al.	A 24 month study was done in 3 groups. Baseline, intervention and post intervention group to evaluate VAP rate & incidence, microbiological profile, duration of MV and ICU days	To evaluate incidence of VAP in multidisciplinary ICU & examine effect of implementing a ventilator care bundle and staffs incidence on VAP incidence.	Implementation of VAP bundle of care & staff education decreased both VAP incidence and ICU days.	Education is an important aspect for successful implementation of a VAP care bundle in decreasing VAP rate.
An evidence-based recommendation on bed head elevation for MV patients 2011	Niël-Weise BS et al.	Systematic review on benefits & disadvantages of semi-upright position in MV patients according to PRISMA guidelines.	To develop recommendations based on the results from the systematic review.	Expert prefer the semi upright position in MV patients.	The review failed to prove clinical benefit of semi upright position.
Closed suction system versus open suction system 2017	Ahmed Elmansoury & Hedya Said	2 groups of MV patients were selected. One received OTSS and the other CTSS.	Comparing CTSS v/s OTSS in adult MV patients in terms of VAP incidence, mortality rate and ICU days	No significant difference in VAP incidence, mortality rate were noted between the 2 study groups.	ICU days declined in patients with OTSS.
Effect of oral hygiene using chlorhexidine (CHX) on preventing VAP in critical care settings: A meta-analysis of randomized control trials 2013	Hiroshi Hoshijima et al.,	Literature search done to identify clinical trials comparing oral hygiene with CHX with conventional care in terms of VAP incidence.	To assess effectiveness of CHX versus conventional oral care in decreasing VAP incidence.	Oral CHX use significantly reduced VAP incidence.	However the mortality rate was not affected.

LME Dissertation

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5	www.rcjournal.com Internet Source	<1%
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